

May 1, 2006
Project No. 301699005

Mr. Richard Zambito
RTKL Associates Inc.
1250 Connecticut, N.W.
Washington, D.C. 20036

Subject: Geotechnical Evaluation
Veterans Affairs Medical Center
North Las Vegas, Nevada

Dear Mr. Zambito:

Transmitted herein are the results of Ninyo & Moore's geotechnical evaluation for the proposed Veterans Affairs Medical Center to be located southeast of the intersection of Pecos Road and Clark County Beltway 215 in North Las Vegas, Nevada. The purposes of our geotechnical study were to evaluate the subsurface soil conditions at the site and to provide design and construction recommendations regarding geotechnical aspects of the project. This report presents the findings of our subsurface exploration, results of our laboratory testing, conclusions regarding the subsurface conditions at the subject site, and geotechnical recommendations for the design and construction of this project.

We appreciate the opportunity to be of service to you on this project. Should you have any questions or comments regarding this report, please contact the undersigned at your convenience.


Respectfully submitted,
NINYO & MOORE



Naik Banavathu
Project Manager

NB/BLO/ltk

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1. INTRODUCTION

In accordance with your request, Ninyo & Moore has performed a geotechnical evaluation for the proposed Veterans Affairs Medical Center to be located southeast of the intersection of Pecos Road and Clark County Beltway 215 (CC-215) in North Las Vegas, Nevada. The location of the site is indicated on Figure 1. The purposes of our geotechnical study were to evaluate the subsurface soil conditions at the site and to provide design and construction recommendations regarding geotechnical aspects of the project. This report presents the findings of our subsurface exploration, results of our laboratory testing, conclusions regarding the subsurface conditions at the subject site, and geotechnical recommendations for the design and construction of this project.

Ninyo & Moore also previously performed a preliminary geotechnical evaluation for the project. This earlier study included preparation of the referenced report (Ninyo & Moore, 2005).

2. SCOPE OF SERVICES

The scope of our services included the following:

- Review of pertinent background data listed in the Selected References section of this report. The data reviewed included a site plan, design codes and manuals, aerial photographs, in-house geotechnical and soils data, referred geotechnical report, and published geologic maps and literature.
- Coordination and mobilization for subsurface exploration, including clearance of existing utilities at the site conducted through Underground Service Alert (USA).
- Drilling, logging, and sampling of 30 exploratory soil borings to depths ranging from approximately 4.4 to 74.0 feet to evaluate subsurface soil conditions and to obtain soil samples for laboratory testing.
- Performance of six soil percolation tests to evaluate the rate of water infiltration into the subsurface soils in proposed parking lot areas.
- Performance of laboratory tests on selected soil samples obtained from the exploratory excavations to evaluate mechanical and engineering properties, including in-place moisture content and dry density, gradation, plasticity, consolidation characteristics, expansion potential, R-value, solubility potential, resistivity, sulfate content, sodium content, and sodium sulfate content.

- Compilation and analysis of the accumulated data.
- Preparation of this geotechnical evaluation report presenting our findings, conclusions, and recommendations, including geotechnical recommendations regarding earthwork, structure foundations, lateral earth pressures, concrete slab-on-grade floors, exterior concrete flatwork and curbs and gutters, preliminary pavement sections for the dedicated streets, pavement sections for parking and access areas, concrete and corrosion considerations, and moisture infiltration reduction and surface drainage.

3. PROJECT DESCRIPTION

We understand that the subject project will include designing and constructing a medical facility on a site that is approximately 144.7 acres in size, of which approximately 120 acres is anticipated to be utilized. Based on our review of the referenced plan (RTKL, 2006), the project will include a series of structures ranging from a two-story for the Business Administration and Education Departments, three-story Ambulatory, Outpatient Care Area, six-story Patient Tower, two-story Mental Health wing and three-story Nursing Care Units building. The project also includes a warehouse area, loading dock area, and central plant east of the main facility, and a partial basement below the Diagnostic and Treatment building. Footings for the basement are anticipated to be at a depth of up to 21.5 feet below finished grade. A tunnel or a partial tunnel is being considered between the main facility and the central plant. Structural loads for the structures are anticipated to be low to high. The structures are anticipated to be of steel-frame or masonry construction with slab-on-grade floors. We also understand that the northern portion of the site will be cut down up to approximately 10 feet and the southern portion will be filled up to approximately 10 feet.

We also understand that the project will include half-street improvements for Pecos Road, Deer Springs Way, and Walnut Road (dedicated streets). Pecos Road improvements are proposed from Deer Springs to CC-215, and will consist of removing a 32-foot wide existing temporary asphalt concrete roadway and replace with half street improvements. Deer Springs Way is proposed to be constructed from Pecos Road to Walnut Road. Walnut Road is proposed to be constructed from Deer Springs Way to the CC-215 right-of-way (ROW). Exterior flatwork, paved parking and access road areas, and retaining walls are also anticipated for the project. Off-site utilities, such as water and sewer lines were not a part of our evaluation.

Consideration is being given to utilizing planter areas in parking lots to handle surface runoff during rainstorms by constructing percolation basins. This method will be used if the percolation rates at the site are adequate.

4. GENERAL SITE CONDITIONS

The subject site is located adjacent to Pecos Road between Centennial Parkway and CC-215 in North Las Vegas, Nevada. The approximately 144.7-acre site is contained within a portion of Clark County Assessor's Parcel No. 123-19-000-001 designated as Government Lots 2 and 3. The site is bordered generally by Pecos Road on the west, and undeveloped portions of Parcel No. 123-19-000-001 on the north, south, and east (Figure 2).

At the time of our field activities, the site was undeveloped. The ground surface was generally undisturbed although a few vehicular trails were observed extending across the site. A few spoils piles (fill) were observed in the northern portion and along the eastern boundary of the site. Some scattered trash and areas of dumped construction debris were also observed.

The topography at the site is slightly undulatory and it slopes downward to the south. Numerous ephemeral drainage washes, up to a few feet wide and deep, were observed. The washes were dry at the time of our field activities.

Indications of underground utilities were not observed at the site during our field activities. However, the Williams-Kern River high-pressure gas transmission underground pipeline and underground fiber optic utility easement was observed extending in a general northeast-southwest direction in the southern portion of the parcel located south of the subject site. Additional underground utilities may also be present in the site vicinity. Overhead utilities observed included high-voltage electric lines extending along Pecos Road.

5. FIELD EXPLORATION AND LABORATORY TESTING

Ninyo & Moore's subsurface exploration of the project site was performed between February 24, 2006, through March 02, 2006. This exploration consisted of drilling, logging, and sampling 30

small-diameter exploratory borings (B-1 through B-30). The borings were advanced to depths ranging from approximately 4.4 to 74.0 feet with truck-mounted CME 85 and Mobile B-60 drill rigs utilizing 8-inch outside diameter hollow-stem augers and the boreholes were backfilled with drill cuttings after drilling operations.

The purposes of the exploratory borings were to evaluate subsurface soil and groundwater conditions at the project site and to obtain soil samples for laboratory testing. The approximate locations of the borings are shown on Figure 2. The approximate ground surface elevations are also presented on the boring logs. Logs of the borings and a description of sampling procedures utilized are presented in Appendix A.

Laboratory tests were performed on representative soil samples collected from the borings to evaluate mechanical and engineering properties, including in-place moisture content and dry density, gradation, plasticity, consolidation characteristics, expansion potential, R-value, solubility potential, resistivity, sulfate content, sodium content, and sodium-sulfate content. In-place moisture content and dry density test results are indicated on the boring logs in Appendix A. The other laboratory test results and descriptions of the testing procedures utilized are presented in Appendix B and Appendix C (Chemical and Solubility Test Results).

Six percolation test holes were excavated on March 30, 2006 within proposed parking lot areas. Percolation tests were performed in approximately 8-inch diameter holes which had been excavated through the upper approximate 1 foot of soil. The locations of the percolation tests are also shown on Figure 2.

Ninyo & Moore previously performed 12 borings during the preliminary geotechnical evaluation for the project. The borings were drilled to depths ranging from 14.4 feet to 39.4 feet. The location of the previous borings are indicated on Figure 2. The boring logs from the preliminary evaluation are presented in Appendix D.

6. GEOLOGY AND SUBSURFACE CONDITIONS

Based on the findings of our limited subsurface exploration and review of referenced geologic and soils information, the site is underlain by Quaternary-age alluvium (native soil). Near-surface undisturbed native soils at the site have been previously mapped as the Weiser unit, which consists of silty gravel and poorly graded gravel with silt and clay. Ninyo & Moore's findings regarding the geologic setting, geologic hazards, ground motion, site seismic class, subsurface unit encountered, groundwater, and liquefaction at the site are provided in the following sections.

6.1. Geologic Setting

The site is located in the northern portion of the Las Vegas Valley, which lies in the southwestern portion of the Great Basin, within the Basin and Range physiographic province. The Las Vegas Valley is a naturally formed structural basin as a result of block faulting, a fundamental characteristic of the Basin and Range physiographic province.

The Las Vegas Valley extends in a northwest-southeast direction and it drains generally toward the southeast through the Las Vegas Wash into Lake Mead. Surrounding the alluvium-filled Valley are relatively steep mountain ranges. These ranges are the Spring Mountains to the west; the Desert, Sheep, and Las Vegas ranges to the north; the McCullough Range to the south; and Sunrise Mountain and Frenchman Mountain to the east.

Based on our review of the referenced geologic data, the Las Vegas Valley is underlain by Proterozoic igneous and metamorphic basement rock, which is overlain by thick Paleozoic and Mesozoic sedimentary rock, and Tertiary volcanic rock. The floor of the Las Vegas Valley is underlain by Tertiary and Quaternary alluvial, aeolian, and playa deposits surrounded by more steeply sloping alluvial aprons, or fans, of poorly sorted gravel and sand deposits. These sediments can be up to approximately 5,000 feet thick in some parts of the Las Vegas Valley.

6.2. Potential Geologic Hazards

Ninyo & Moore's geotechnical study of the project site included an evaluation of the possible presence of geologic hazards, such as faults and ground fissures in the site area. This evaluation included visual observation of the site for indications of adverse geologic features and review of published geologic and soils maps and literature, and other data listed in the Selected References section of this report. Referenced geologic data were also reviewed to evaluate seismic activity levels, and associated potential earthquake hazards, for faults in the site vicinity. It should be noted that the fault seismic activity levels provided in this section were obtained/interpreted primarily from United States Geological Survey (USGS, 2006) data.

Based on our field observations and review of referenced data, no faults extend through the project site. Review of referenced geologic data indicates that the nearest active fault (i.e., a fault that has experienced ground surface rupture within the past 11,000 years) to the site is the Black Hills fault. The Frenchman Mountain fault and the Eglington fault, which are considered potentially active (i.e., faults that have been experienced ground surface rupture within the past 1.6 million years) are also located in the site vicinity. The distances from the site to these active and potentially active faults are provided in the following Table.

Review of referenced geologic data also indicates that the site is located near an unnamed Las Vegas Valley fault. The distance from the site to this fault is provided in the following Table. Referenced USGS data indicate that this fault is of uncertain origin and that its seismic activity level has not been established. Further, there is some controversy among geologists as to the origin of this geologic feature, and other similar features in Las Vegas Valley, which have been previously referred to as "compaction faults". Differing proposed origins for these faults include:

- Differential consolidation or compaction over time of the thick alluvial and lakebed sediments in Las Vegas Valley.
- Tectonic factors associated with faults that may extend into the basement bedrock beneath the Valley's sediment.

- A combination of differential consolidation and tectonic factors.

Table 1 – Faults in Site Vicinity

Fault Name	Seismic Activity Level *	Approximate Distance From Project Site to Fault (miles)
Black Hills fault	Active	26.0
Eglington fault	Potentially Active	2.4
Frenchman Mountain fault	Potentially Active	6.2
Las Vegas Valley faults (unnamed fault)	Not Established	2.3
* From United States Geological Survey (USGS, 2006) data.		

Ground fissures, generally believed to be caused by erosion, and differential stress resulting from regional subsidence due primarily to withdrawal of groundwater, are known to occur near faults in Las Vegas Valley. Review of referenced geologic data does not indicate the presence of ground fissures at the project site and no ground fissures were observed during our field activities.

As part of this study, Ninyo & Moore evaluated whether the project site is located in a Special Geotechnical Considerations Area, as shown on the referenced Clark County Soil Guidelines Map (CCBD and NBMG, 1998). This map indicates important aspects of near-surface soils in Las Vegas Valley. Review of the referenced Clark County Soil Guidelines Map indicates that a portion of the site is located within a Special Geotechnical Consideration Area described as “Potential Drainage Areas or Recent Sediment Deposits.” Soils in such a Special Geotechnical Consideration Area may have solubility, clay swell, corrosion, gypsum salt, and expansive or hydro-collapse potential.

6.3. Ground Motion

Ninyo & Moore performed a ReMi survey during the course of our preliminary geotechnical evaluation (Ninyo & Moore, 2005) in the central portion of the site to evaluate the seismic Site Class, as described in the referenced International Building Code (ICC, 2003). Data was collected to a depth of approximately 100 feet using a geophone array (line) using a Ge-

ometrics 24 channel SmartSeis SE with 20 4.5-Hz P-wave geophones spaced approximately 20 feet apart. The approximate location and orientation of the array is indicated on Figure 2. Ambient noise (microtremors) was recorded for a total period length of 16.38 seconds with a sampling interval of 2,000 microseconds. The one-dimensional shear wave velocity structure and average shear wave velocity to approximately 100 feet deep was evaluated using Optim Software's SeisOpt ReMi v.20 software.

The calculated average shear wave velocity to a depth of 100 feet at the location of the geophone array was approximately 3,022 feet per second. Based on this finding and the findings of our limited subsurface exploration, a Site Class C is characteristic of the site for design purposes.

Estimated maximum considered earthquake ground motions across the United States are provided in the referenced ICC 2003 International Building Code (IBC). The mapped ground motions are at 0.2-second and 1.0-second periods with 5 percent critical damping. According to the IBC, the parameters in the following table are characteristic of the site for design purposes.

Table 2 – Seismic Design Parameters

Parameter	Value		2003 IBC Reference
	Short Period	Long Period	
Mapped Maximum Considered Earthquake Spectral Response Acceleration, S_s and S_1	0.57g	0.18g	Figure 1615
Site Coefficient, F_a and F_v	1.17	1.62	Table 1615.1.2
Maximum Considered Earthquake Spectral Response Acceleration Adjusted for Site Class Effects, S_{MS} and S_{M1}	0.67g	0.29g	Equation 16-38 and 16-39
Design Spectral Response Acceleration, S_{DS} and S_{D1}	0.45g	0.19g	Equation 16-40 and 16-41

6.4. Subsurface Unit Encountered

Alluvium was encountered in the exploratory borings to the total depths explored (up to approximately 74.0 feet). The alluvium consisted predominantly of an upper layer of loose to very dense, silty gravel with sand overlying layers of very stiff, slightly cemented sandy lean clay with gravel. Slightly to highly gypsiferous and slightly porous zones were also encoun-

tered. The slightly porous clay soils were encountered at depths of approximately 7.5 feet or deeper.

Slightly cemented soils and a few layers of moderately hard to hard, moderately to strongly cemented soils (caliche) were encountered in seven of the borings. Caliche is a naturally occurring cemented soil with rock-like characteristics. The following describes typical properties of caliche encountered in southern Nevada.

- Caliche generally occurs in layers a few inches to several feet thick.
- Caliche layers can vary significantly in the thickness, degree of cementation, and harness over short distances, and it can be discontinuous.
- Caliche varies in composition from primarily fine-grained material to primarily coarse-grained material.
- Moderately hard, moderately cemented caliche can generally be gouged with a knife with difficulty and can be broken with a few hammer blows.
- Hard to very hard, strongly cemented caliche is difficult to scratch with a knife and breaks with difficulty with repeated hammer blows.
- Considerable difficulties may be encountered in caliche removal. Rock excavation methods may be needed.

The following table presents the approximate depth of, thickness of, and hardness and degree of cementation of the caliche layers encountered in the borings.

Table 3 – Caliche Layers Encountered

Boring Location	Approximate Depth of Caliche Layer (feet)[*]	Approximate Thickness of Caliche Layer (feet)	Hardness and Degree of Cementation of Caliche Layer
B-19	35	14.0 ^{**}	Moderately hard, moderately cemented
B-20	18.5	2.5	Moderately hard, moderately cemented
	23.0	16.3 ^{**}	Moderately hard , moderately cemented
B-21	27.0	2.0	Moderately hard, moderately cemented
	33.0	16.2 ^{**}	Moderately hard to hard, moderately cemented to strongly cemented
B-22	45.0	2.0	Moderately hard, moderately cemented
	54.0	20.0 ^{**}	Moderately hard to hard, moderately cemented to strongly cemented
B-24	33.5	15.5 ^{**}	Moderately hard, moderately cemented
B-26	19.5	9.9 ^{**}	Moderately hard to hard, moderately cemented to strongly cemented
B-29	26.0	3.4 ^{**}	Moderately hard, moderately cemented
[*] Depth measured from ground surface at time of drilling. ^{**} Boring terminated in caliche.			

Laboratory tests were performed on selected samples of alluvium obtained from the borings. The results of these tests are summarized in the following table. The results of in-place moisture content and dry density tests are also presented on the boring logs in Appendix A. Additional information regarding the laboratory test procedures and results are provided in Appendix B and Appendix C.

Table 4 – Summary of Laboratory Test Results

Test Type	Test Results	Test Result Classification
In-Place Moisture Content	0.7 to 19.6 percent	--
In-Place Dry Density	76.6 to 128.3 pcf	Low to moderate dry densities
Atterberg Limits Liquid Limit Plastic Limit	No value to 65 No value to 26	--
R-Value	70 to 79	--
Swell potential	-0.15 to -1.19 percent	--
Resistivity In-situ moisture content Saturated	9,300 to >30,000 ohm-cm 310 to 9,800 ohm-cm	Very severely corrosive to buried metal
Sodium Content	0.00 to 0.06 percent	--
Sulfate Content	0.00 to 0.23 percent	Negligibly to severely deleterious to concrete
Sodium Sulfate Content	0.00 to 0.14	Negligible chemical (salt) heave potential
Total Salts (Solubility)	0.05 to 1.35 percent	very low to moderate solubility potential

6.5. Soil Percolation

Our evaluation also included performing six soil percolation tests (PT-1 through PT-6) in proposed parking lot areas. The percolation tests were performed in approximately 8-inch diameter holes excavated through the upper approximate 1 foot of soil. The purpose of the soil percolation tests was to evaluate the rate of water infiltration into the subsurface soils. The approximate locations of the soil percolation test holes are shown on Figure 2.

The test holes were excavated and then filled with water prior to testing. The water in the test holes was subsequently adjusted to a depth of approximately 6 inches and percolation rate measurements were made. Results of these tests are provided in the following table.

Table 5 – Soil Percolation Test Results

Percolation Test Hole	Percolation Rate (minutes per inch)
PT-1	4.1
PT-2	4.9
PT-3	5.0
PT-4	7.5
PT-5	5.5
PT-6	5.0

6.6. Groundwater

Groundwater was not encountered in the exploratory borings, which were advanced to depths of up to approximately 74.0 feet. Based on review of the referenced State of Nevada Division of Water Resources well log database, the depth to groundwater in the vicinity of the site may be deeper than approximately 115 feet below grade. Seasonal fluctuations in groundwater levels and surface water flow may occur. These fluctuations may be due to variations in ground surface topography, subsurface geologic conditions, rainfall, irrigation, and other factors. Evaluation of factors associated with groundwater fluctuations was beyond the scope of this study.

6.7. Liquefaction

Liquefaction is a phenomenon in which loose, saturated soils lose shear strength under short-term (dynamic) loading conditions. Ground shaking of sufficient duration results in the loss of grain-to-grain contact in potentially liquefiable soils due to a rapid increase in pore water pressure, causing the soil to behave as a fluid for a short period of time. To be potentially liquefiable, a soil is typically cohesionless with a grain-size distribution generally consisting of sand and silt. It is generally loose to medium dense, saturated, and subjected to sufficient magnitude and duration of ground shaking.

Soils encountered in the exploratory borings at the site consisted primarily of loose to very dense, silty gravel with sand, and slightly cemented, very stiff clays, with layers of moderately hard and hard, moderately cemented and strongly cemented caliche layers.

Review of the referenced State of Nevada Division of Water Resources well log database indicates that the depth to groundwater in the vicinity of the site may be deeper than approximately 115 feet below grade.

7. FINDINGS AND CONCLUSIONS

Based on the findings of this study, there are no known geotechnical or geologic conditions that would preclude the proposed development of the site, provided the recommendations presented herein are implemented and appropriate construction practices are followed. Geotechnical design and construction considerations for the proposed project include the following:

- Structure foundations that are shallower than 6 feet below existing grade may be founded on medium dense to very dense native soils or on adequately placed and compacted structural fill. Foundations for the proposed basement that are anticipated to be deeper than 6 feet below existing grade should be founded on zone of 2.5 feet of adequately placed and compacted structural fill (reworked on-site or imported soil) as discussed in section 8.1.1. Recommendations regarding design of foundations are provided in Section 8.2.
- Laboratory test results and field observations indicated that the native clay soils encountered at depths deeper than approximately 7.5 feet were dry, porous, and prone to slight to moderate consolidation if inundated with water. It is anticipated that there will be cuts at the site up to approximately 10 feet during site grading. The geotechnical consultant should observe footing excavation bottoms to evaluate the exposed soils and if removal and replacement of the existing soils with structural fill is needed. In addition, measures should be taken to reduce moisture infiltration into the soils underlying structures, as discussed in Section 8.10.
- Layers of caliche were encountered at depth in the exploratory borings. These cemented layers were up to approximately 20 feet thick in some of the borings. Due to the variable nature of caliche, additional more shallow caliche layers may exist at the site. If caliche is encountered, rock-excavation techniques, including use of heavy-duty backhoe and/or trenchers, headache ball, hoe-ram, and/or rock-saw, or other excavation methods should be anticipated for the project.
- Findings of our study indicate that the non-cemented native soil encountered in the borings is generally suitable for use as structural fill and backfill. However, layers of moderately hard to hard, moderately to strongly cemented soils (caliche) were also encountered in the borings. Oversize materials should be anticipated from caliche excavation. Oversize materials should be processed as described in Section 8.1.1 to meet the recommendations for structural fill and backfill, or be removed from the site. Excavated on-site native soils may be used as

structural fill and backfill provided they meet the recommendations presented in Sections 8.1.2.

- Results of laboratory tests indicate that the non-cemented native soils generally do not meet USSPWC requirements for Type I and Type II Aggregate Base. However, based on the laboratory R-value test results, the granular native soils at the site have an R-value higher than 60, which indicates that they may be used as Type I Aggregate Base in roadways.
- Some shrinkage should be anticipated when on-site non-cemented soils are excavated, processed, and compacted. For planning purposes, approximately 25 percent shrinkage may be anticipated.
- Due to the presence of cemented soils at the site, bulking of this material should be anticipated when this material is excavated, processed/crushed, and compacted. For planning purposes, up to approximately 10 percent bulking should be anticipated.
- Exterior or interior foundation perimeter drains should be installed below basement floor elevations.
- Review of published geologic data and our field observations, do not indicate the presence of adverse on-site geologic hazards, such as faults and ground fissures, which may affect the proposed site development.
- Findings of our study indicate that a seismic Site Class of C and parameters provided in Table 1 are characteristic of the site and should be considered in the design of the proposed structures, where appropriate.
- Due to soil conditions encountered in the exploratory borings and anticipated depth to groundwater, it is our opinion that there is a low potential for liquefaction of the subsurface soils at the site.
- Groundwater was not encountered in our explorations, which were excavated to depths of up to approximately 74.0 feet. Therefore, groundwater is not anticipated to adversely affect construction of the proposed improvements.

8. RECOMMENDATIONS

The following recommendations are intended for incorporation into the design and construction of the proposed buildings and exterior site improvements.

8.1. Earthwork

The following sections provide recommendations for earthwork, including site grading, structural fill and backfill, import soil, and temporary excavations at the site.

8.1.1. Site Grading

Prior to grading, the areas of proposed site improvements should be cleared of any surface obstructions, debris, organics (including vegetation), and other deleterious materials. Such materials generated from clearing operations should be removed from the project site and disposed of at a legal landfill site.

After the previously described removals have been performed, the full depth of any existing on-site fill and loose and/or disturbed native soils should be removed/excavated from proposed building and exterior site improvement areas, including block screen/retaining wall, pavement, and concrete flatwork areas, processed, and stockpiled for later use as structural fill at the site. Prior to placement and compaction of structural fill, the geotechnical consultant should observe footing excavation bottoms to evaluate the exposed soils and if removal and replacement of the existing soils with structural fill is needed. Scarification may terminate where moderately hard to very hard caliche is encountered, as evaluated in the field by the geotechnical consultant.

Some shrinkage should be anticipated when the native non/slightly cemented soils are excavated, processed, and compacted. For planning purposes, an estimated shrinkage factor of approximately 25 percent may be used for soils within approximately 5 feet of the existing ground surface. Depending on finished grade elevations for the project, some importation of soils may be needed.

As previously indicated, layers of caliche were encountered in the borings. Therefore, rock excavation techniques should be anticipated for utility trench excavations and during grading operations, particularly in areas of cut. Use of heavy-duty ripping equipment, heavy-duty backhoe, headache ball, hoe-ram, and/or rock saw should be

anticipated. The contractor should be aware of the potential for (and take adequate precautions to reduce the potential for) vibrational damage to adjacent or nearby structures, and take appropriate precautions, when using heavy impact equipment during removal of caliche. Oversize materials will likely be generated during excavation of the cemented soils at the site. These materials will need to be crushed prior to use as structural fill and backfill, or removed from the site and disposed of in a suitable manner. Bulking of this material should be anticipated when it is excavated, processed/crushed, and compacted. For planning purposes, up to approximately 10 percent bulking should be anticipated.

It is anticipated that there will be cuts at the northern end of the site up to approximately 10 feet during site grading. If grading operations expose relatively porous, hydro-collapsible, native clay soils at footing bottom elevations, the encountered soils should be overexcavated to approximately 2.5 feet below the foundation bottom and replaced with adequately compacted structural fill.

Ninyo & Moore's field observations and laboratory test results indicated that the native soils encountered in our exploratory borings should generally be suitable for use as structural fill and backfill material. The excavated on-site soils may be used as structural fill and backfill provided they meet the recommendations presented in the following section.

8.1.2. Structural Fill and Backfill

Soils used as structural fill and backfill should be placed and compacted in uniform horizontal lifts to a relative compaction of 90 percent (95 percent in paved parking access and roadway areas), as evaluated by ASTM D 1557. Structural fill placed lower than 5 feet below finished grade should be compacted to 95 percent. Retaining wall and utility trench backfill should be similarly placed and compacted to a relative compaction of 90 percent (ASTM D 1557).

Structural fill and backfill soils should be placed and compacted at a moisture content within approximately 2 percent of optimum for granular soils and approximately 2 percent above optimum for cohesive soil. The actual optimal lift thickness of fill during grading will depend on the type of soil and compaction equipment used, but should generally not exceed approximately 8 inches in loose thickness.

Structural fill and backfill soils should not contain organic matter, debris, other deleterious matter or rocks or hard chunks larger than approximately 6 inches nominal diameter. These soils should have a low solubility potential (3 percent or less) and a very low to low expansion potential (EI less than 50), as evaluated by ASTM D 4829 (Expansion Index Test).

Placement and compaction of structural fill should be performed in accordance with Uniform Standard Specifications for Public Works' Construction, Off-Site Improvements (USSPWC), Clark County Area, Nevada, Third Edition (Clark County, 2001a). Grading and earthwork should be observed and the geotechnical consultant should test compaction of structural fill and backfill materials prior to placing subsequent lifts.

8.1.3. Import Soil

We recommend that any import soil consist of coarse-grained (50 percent or more retained on No. 200 sieve) material with a low solubility potential (1.0 percent or less), as evaluated by the referenced Clark County Department of Building Inspection Services, Technical Guideline (TG) TG-19-2001, a low sulfate content (less than 0.1 percent), and a very low to low expansion potential (EI less than 50) as evaluated by the latest version of American Society for Testing and Materials (ASTM) D 4829. We further recommend that proposed import material be evaluated by Ninyo & Moore at the borrow site for its suitability prior to importation to the project site. Import soil to be used as structural fill and backfill should be placed and compacted in accordance with the recommendations set forth in the previous sections.

8.1.4. Temporary Excavations

Temporary excavations should be performed in accordance with the referenced Occupational Safety and Health Administration (OSHA) Construction Industry Regulations (OSHA, 2005) requirements and recommendations. Excavations deeper than 5 feet should be benched or laid back at a slope no steeper than 1:1 (horizontal to vertical), measured from the bottom elevation of the excavation, or the excavation should be appropriately shored. Temporary earth-retaining systems will be subjected to lateral loads resulting from earth pressures. A structural engineer experienced in retaining systems for temporary excavation should be consulted by the contractor during the design of the shoring system. On-site safety of personnel is the responsibility of the contractor.

Spoils from excavations should not be placed near the edges of the excavations. For open-cut trenches or unbraced excavations, spoil piles should be placed away from the edge of the excavation at a distance equivalent to the excavation depth. In addition, surface drainage should be directed away from the top edge of trench excavations and traffic should be routed as far away from the excavation as practical during construction.

8.2. Structure Foundations

Structure foundations should have a width of 12 inches and an embedment depth of 18 inches below adjacent finished grade for buildings and 12 inches below adjacent finished grade for screen/retaining wall foundations. Structure foundations shallower than 6 feet below existing grade should be founded on medium dense to very dense and/or very stiff, native soils or a zone of structural fill (reworked native or import soils) or entirely on caliche. Foundations for the proposed basement and/or tunnel that are anticipated to be deeper than 6 feet below existing grade should be founded on 2.5 feet of adequately placed and compacted structural fill (reworked on-site or imported soil).

An allowable bearing pressure of 2,000 pounds per square foot (psf) may be used for isolated and continuous footings with an embedment of 18 inches below adjacent finished grade and a width of 12 inches. This allowable value may be increased by 800 psf for each

additional 1 foot of width, and 1,500 psf for each additional 1 foot of embedment up to a value of 5,500 psf. These allowable bearing capacities may be increased by one-third for short duration loads, such as wind or seismic. Lateral resistance for footings is presented in the following section. Foundations should be designed and constructed in accordance with recommendations of a qualified structural engineer.

Due to the potential for damaging differential settlement, structure footings (isolated and continuous) should not bear on both caliche and non-cemented or slightly cemented soils. If both cemented and non-cemented/slightly-cemented soils are present at the footing base, the caliche should either be overexcavated approximately 12 inches and replaced with structural fill, or the non/slightly cemented soils should be overexcavated to expose caliche and replaced with lean concrete or Type II Aggregate Base compacted to 95 percent relative compaction, as evaluated by ASTM D 1557.

Footings should be reinforced with two No. 4 or larger steel reinforcing bars, one placed near the top and one near the bottom of the footings, and in accordance with a qualified structural engineer's recommendations. Increased reinforcement may be recommended by the structural engineer. Seismic parameters for design of foundations for proposed buildings and any retaining walls at the site are provided in Section 6.3.

8.3. Lateral Earth Pressures

Retaining walls, which are not restrained from movement at the top and have level backfill behind the wall, may be designed using an "active" equivalent fluid unit weight of 37 pounds per cubic foot (pcf), as indicated on Figure 3. Retaining walls, which are restrained from movement at the top and have level backfill behind the wall, may be designed using an "at-rest" equivalent fluid unit weight of 57 pcf, as indicated on Figure 4. These values assume compaction within about 5 feet of the wall will be accomplished with relatively light compaction equipment and that very low to low expansive backfill will be placed behind the wall. These values also assume that retaining walls will have a height of less than 10 feet.

Ninyo & Moore has evaluated “active” seismic earth pressure coefficients based on the Mononobe-Okabe equation for an active driving wedge. Our analysis considered no groundwater, level backfill, no wall batter, no friction between the wall and backfill soils, and backfill soils with an angle of internal friction of 33 degrees compacted to 130 pcf. Based on our calculations, Ninyo & Moore recommends that retaining walls, which are not restrained from movement at the top, be designed using an additional inverted triangular “active” equivalent fluid unit weight of 8 pcf, as indicated on Figure 3, where appropriate. Retaining walls, which are restrained from movement at the top, be designed using an additional inverted triangular “at-rest” equivalent fluid unit weight of 17 pcf, as indicated on Figure 4.

Retaining walls with level backfill should also be designed to resist “active” and “at-rest” surcharge pressures of $0.29q$ and $0.45q$, respectively. The value for “q” represents the pressure induced by adjacent light loads, slab, or traffic loads plus any adjacent footing loads.

Measures should be taken so that moisture does not build up behind retaining walls. Drainage measures, as indicated on Figure 5, should include free-draining backfill material, and perforated drain pipes or weep holes lined with polyvinyl chloride (PVC) pipe. Drain pipes should outlet away from structures, and retaining walls should be adequately waterproofed in accordance with the recommendations of the project civil engineer or architect.

For passive resistance to lateral loads, we recommend that an equivalent fluid weight of 270 pcf be used up to a value of 3,000 psf. This value assumes that the ground is horizontal for a distance of 10 feet or more, or three times the height generating the passive pressure, whichever is greater. We recommend that the upper 12 inches of soil not protected by pavement or a concrete slab be neglected when calculating passive resistance. For frictional resistance to lateral loads, we recommend that a coefficient of friction of 0.43 be used between soil and concrete. Passive and frictional resistances may be used in combination, provided the passive resistance does not exceed one-half of the total allowable resistance. The passive resistance may be increased by one-third when considering loads of short duration such as wind or seismic forces.

8.4. Concrete Slab-On-Grade Floors

Ninyo & Moore recommends that conventional concrete slab-on-grade floors (including supportive base material) be founded on a zone of structural fill (reworked native or import soils), as described in Section 8.1.1. The floor slabs should be 4 inches in thickness. Floor slabs should be designed in accordance with recommendations of a qualified structural engineer. Greater floor slab thickness may be recommended by the structural engineer.

As a means to help reduce shrinkage cracks, we recommend that the slabs be provided with construction joints at spacing intervals of no more than approximately 15 feet, each way and reinforced with No. 3 steel reinforcing bars placed at approximately 18 inches on-center both ways. Reinforcement of the slab should be placed at mid-height. We recommend that “chairs” be utilized to aid in the placement of the reinforcement. Floor slab reinforcement and joint spacing should also be in accordance with the recommendations provided by a qualified structural engineer. Greater slab thickness and reinforcement and reduced construction joint spacing may be recommended by the structural engineer.

Floor slabs should also be underlain by approximately 6 inches of Type II Aggregate Base compacted to 90 percent of the laboratory maximum dry density, as evaluated by ASTM D 1557. A moisture and mineral migration barrier should be provided by a relatively impervious membrane placed beneath slab-on-grade floors. The membrane should consist of visqueen 10 mils in thickness, or equivalent. The membrane may overlie or underlie the previously described approximately 6 inches of compacted base material. If the membrane overlies the base material, it should be covered with approximately 2 inches of moist sand (not saturated) to help reduce the potential for puncture during construction and to aid in concrete curing. The membrane should be placed in accordance with the manufacturer’s recommendations.

8.5. Settlement

Ninyo & Moore estimates that the proposed buildings, designed and constructed as recommended herein, should undergo total settlement of approximately 2 inches or less.

Differential settlement is typically limited to one-half the total amount. As discussed, porous soils with a slight to moderate hydroconsolidation potential were encountered in our borings at a depth of approximately 7.5 feet. If these soils become wetted, additional settlement will likely occur. Measures to reduce water infiltration into the subsoils are discussed in Section 8.10.

8.6. Geotechnical Parameters for the Tunnel Design and Construction

For calculation of overburden loads, Type II Aggregate Base and trench backfill soils, when placed and compacted as specified, may be assumed to have a unit weight of approximately 135 pcf. This value is based on soils being compacted to a relative compaction of 90 percent, as evaluated by ASTM D 1557. CLSM used as trench backfill material may be assumed to have a unit weight of approximately 120 pcf.

The base of the tunnel should be founded on 8 inches or more of Type II Aggregate Base overlying medium dense to very dense, granular soils or very stiff clay or adequately compacted structural fill. If the clay soils at the tunnel bottom elevation are relatively porous, as evaluated by the geotechnical consultant during grading, the porous soils should be over excavated approximately 2.5 feet and replaced with structural fill. Exposed loose or disturbed surficial soil at the base of tunnel excavations should be moisture-conditioned and compacted to 90 percent relative compaction, as evaluated by ASTM D 1557. The Type II Aggregate Base should be in conformance with Section 704.03.04 of the Uniform Standard Specifications for Public Works' Construction (USSPWC) and be compacted to 90 percent relative compaction, as evaluated by ASTM D 1557. An allowable bearing value of 5,500 psf may be used in design of tunnel. This allowable bearing pressure may be increased by one-third for short duration loads, such as seismic. Design parameters for frictional resistance to lateral loads have been provided in Section 8.3. A sump pump should be installed at the low point to surface discharge any water collected due to leaks or maintenance operations.

8.7. Exterior Concrete Flatwork and Curbs and Gutters

Exterior concrete flatwork, such as walkways and entryway slabs, should be approximately 4 inches in thickness and founded on 12 inches structural fill (reworked native or import soils). It is suggested that to reduce the potential for shrinkage cracks, exterior concrete flatwork should be constructed with control joints spaced approximately 5 feet apart for walkways and approximately 10 feet on-center each way for larger slabs. Crack control joint spacing should be in accordance with recommendations of a qualified structural engineer. Reduced joint spacing may be recommended by the structural engineer.

Formation of shrinkage cracks, and other cracks, due to minor soil movement, may be further reduced by utilizing steel reinforcement, such as welded wire mesh. However, due to the inherent difficulty in positioning welded wire mesh in the middle of concrete flatwork, other crack control methods should be considered, such as placement of No. 3 steel reinforcing bars at approximately 24 inches on-center both ways. Reinforcement of the flatwork should be placed at mid-height. “Chairs” should be utilized to aid in the placement of the reinforcement.

Concrete curbs and gutters should be constructed in accordance with recommendations of the project civil engineer. The referenced Clark County Uniform Standard Drawings for Public Works Construction Off-Site Improvements (USDPWC), also provides design specifications for curbs and gutters. Recommendations regarding concrete utilized in construction of proposed improvements are provided in Section 8.9.1.

8.8. Pavement Sections

The following sections provide pavement sections for on-site parking and access areas, and off-site half-street improvements to Pecos Road, Deer Springs Way, and Walnut Road. The potential sections for the dedicated streets should be considered preliminary. The City of North Las Vegas will require that the pavement sections be re-evaluated once the roadways are graded to expose native subgrade. Additional reevaluation tests will need to be performed and the pavements section recalculated.

8.8.1. On-Site Parking and Access Areas

To form a basis for design of flexible pavement for on-site paved parking and access areas, we have assumed the following:

- A design Equivalent Single Axial Load (ESAL) value of 2,960, based on Traffic Index (TI) = 4.5 for automobile traffic; ESAL value of 15,950, based on TI = 5.5 for delivery truck traffic; and ESAL value of 64,920, based on TI = 6.5 for heavy duty truck and bus traffic areas are applicable.
- 80 percent reliability.
- 0.45 standard deviation.
- 4.2 initial serviceability.
- 2.5 terminal serviceability.
- Resilient Modulus (M_R) of 26,300 psi for an R-value of 70 (based on laboratory test results).

Using these values, structural numbers associated with the proposed parking and access areas were calculated using design procedures in accordance with the American Association of State Highway and Transportation Officials method of designing flexible pavement (AASHTO, 1993). The following table presents the recommended structural pavement sections placed over structural fill for on-site parking and access areas:

Table 6 – Flexible Pavement Section Thickness for On-Site Parking and Access Areas

Traffic Type Areas	Design ESAL	Pavement ($a_{\text{asphalt}} = 0.35$)	Base ($a_{\text{base}} = 0.12$)	Recom- pacted Sub- grade	Structural Number Provided	Structural Number Needed
		Asphalt Thickness (Inches)	Type II Base Thickness (Inches)	Thickness (Inches)*		
Automobile	2,960	2.0	4.0	12	1.18	0.58
Delivery Truck	15,950	2.5	4.0	12	1.36	0.90
Heavy Duty Truck	62,920	3.0	4.0	12	1.53	1.24
* Recompacted subgrade below pavement sections may include 12 inches of scarified native soil compacted to 95 percent relative compaction (as evaluated by the latest version of ASTM D 1557). Scarification may terminate where caliche is encountered, as evaluated in the field by the geotechnical consultant.						

If the assumed traffic or design ESAL values are not considered appropriate, this office should be notified. In providing these recommendations for pavement sections, we have assumed that asphalt concrete will be mixed and placed in accordance with Section 401 of the referenced Clark County Uniform Standard Specifications for Public Works' Construction, Off-Site Improvements, USSPWC. We have also assumed that Type II Aggregate Base will conform to Section 704.03.04 of the USSPWC. Type II Aggregate Base materials should be placed and compacted to 95 percent relative compaction (as evaluated by the latest version of ASTM D 1557) in accordance with Section 302 of the USSPWC. Recompacted subgrade below Type II Aggregate Base should be compacted to 95 percent relative compaction (as evaluated by the latest version of ASTM D 1557).

Ninyo & Moore recommends that Portland Cement Concrete pavement be constructed in trash dumpster enclosure areas since such traffic can shorten the useful life of asphalt concrete sections. We recommend that in these areas and for exterior concrete aprons, 600 pounds per square inch (psi) flexural strength Portland cement concrete, 7 inches thick, be placed over approximately 6 inches of Type II Aggregate Base compacted to 95 percent relative compaction, as evaluated by the latest version of ASTM D 1557 over 6 inches of compacted structural fill. We recommend that mix designs be prepared for the asphalt concrete and Portland cement concrete by an engineering company special-

izing in this type of work, and that the paving operations be observed and tested by a qualified testing laboratory. Crack control joint spacing for rigid pavement should be in accordance with recommendations of a qualified structural engineer.

8.8.2. Preliminary Pavement Sections for Pecos Road

To form a basis for design of flexible pavement for off-site half-street improvement to Pecos Road, we have assumed the following:

- Pecos Road is classified as an arterial roadway with a right-of-way width of 120 feet.
- A design Equivalent Single Axial Load (ESAL) value of 17,424,779 based on average annual daily traffic (ADT) = 30,000 is applicable.
- 90 percent reliability.
- 0.45 standard deviation.
- 4.2 initial serviceability.
- 2.5 terminal serviceability.
- Resilient Modulus (M_R) of 26,300 psi for an R-value of 70 (based on laboratory test result).

Using these values, a structural number associated with Pecos Road areas was calculated using design procedures in accordance with the American Association of State Highway and Transportation Officials method of designing flexible pavement (AASHTO, 1993). The following table presents the recommended alternate structural pavement sections placed on compacted soils.

Table 7 – Preliminary Pavement Sections for Pecos Road

Traffic Condition	Equivalent Single-Axle Load (ESAL)	Asphalt Concrete Thickness (inches)	Type II Aggregate Base Thickness (inches)	*Compacted Subgrade Thickness (inches)
Pecos Road	17,424,779	5.0	12	12
		6.0	10	
* Recompacted subgrade below pavement sections may include 12 inches of scarified native soil compacted to 95 percent relative compaction (as evaluated by the latest version of ASTM D 1557). Scarification may terminate where caliche is encountered, as evaluated in the field by the geotechnical consultant.				

If the assumed traffic or design ESAL values are not considered appropriate, this office should be notified. In providing these preliminary recommendations for pavement sections, we have assumed that asphalt concrete will be mixed and placed in accordance with Section 401 of the referenced Clark County Uniform Standard Specifications for Public Works' Construction, Off-Site Improvements, USSPWC. We have also assumed that Type II Aggregate Base will conform to Section 704.03.04 of the USSPWC. Type II Aggregate Base materials should be placed and compacted to 95 percent relative compaction (as evaluated by the latest version of ASTM D 1557) in accordance with Section 302 of the USSPWC. Recompacted subgrade below Type II Aggregate Base should be compacted to 95 percent relative compaction (as evaluated by the latest version of ASTM D 1557).

8.8.3. Preliminary Pavement Sections for Deer Springs Way and Walnut Road

To form a basis for design of flexible pavement for off-site half-street improvement to Deer Springs Way, and Walnut Road, we have assumed the following:

- Deer Springs Way and Walnut Road are classified as major collector roadways with a right-of-way width of 80 feet.
- A design Equivalent Single Axial Load (ESAL) value of 3,522,241 based on ADT = 6,000 for Deer Springs Way and Walnut Road is applicable.
- 90 percent reliability.
- 0.45 standard deviation.

- 4.2 initial serviceability.
- 2.5 terminal serviceability.
- Resilient Modulus (M_R) of 26,300 psi for an R-value of 70 (based on laboratory test result).

Using these values, structural number associated with the proposed Deer Springs Way and Walnut Road was calculated using design procedures in accordance with the American Association of State Highway and Transportation Officials method of designing flexible pavement (AASHTO, 1993). The following table presents the recommended alternate structural pavement section placed on compacted soils.

Table 8 – Preliminary Pavement Sections for Deer Springs Way and Walnut Road

Traffic Condition	Equivalent Single-Axle Load (ESAL)	Asphalt Concrete Thickness (inches)	Type II Aggregate Base Thickness (inches)	*Compacted Subgrade Thickness (inches)
Deer Springs Way	3,522,241	4.0	12	12
Walnut Road	3,522,241	4.0	12	12
* Recompacted subgrade below pavement sections may include 6 inches of scarified native soil compacted to 95 percent relative compaction (as evaluated by the latest version of ASTM D 1557). Scarification may terminate where caliche is encountered, as evaluated in the field by the geotechnical consultant.				

If the assumed traffic or design ESAL values are not considered appropriate, this office should be notified. In providing these recommendations for pavement sections, we have assumed that asphalt concrete will be mixed and placed in accordance with Section 401 of the referenced Clark County Uniform Standard Specifications for Public Works' Construction, Off-Site Improvements, USSPWC. We have also assumed that Type II Aggregate Base will conform to Section 704.03.04 of the USSPWC. Type II Aggregate Base materials should be placed and compacted to 95 percent relative compaction (as evaluated by the latest version of ASTM D 1557) in accordance with Section 302 of the USSPWC. Recompacted subgrade below Type II Aggregate Base should be compacted to 95 percent relative compaction (as evaluated by the latest version of ASTM D 1557).

Adequate surface drainage should be provided to reduce the potential for ponding and infiltration of water into the pavement and subgrade materials. We suggest that the paved areas have a surface gradient of 1 or more percent. In addition, surface runoff from surrounding areas should be intercepted, collected, and not permitted to flow onto the pavement or infiltrate the base and subgrade. We recommend that perimeter swales, edge drains, curbs and gutters, or combinations of these drainage devices, be constructed to reduce adverse effects of surface water runoff.

8.9. Concrete and Corrosion Considerations

The corrosion potential of on-site soils to concrete was evaluated in the laboratory using representative samples obtained from the exploratory excavations. Laboratory testing was performed to assess the effects of sulfate content and electrical resistivity on concrete and buried metal, respectively. Results of these tests are presented in Appendix C. Recommendations regarding concrete to be utilized in construction of proposed improvements and for buried metal pipes are provided in the following sections.

8.9.1. Concrete

Chemical tests performed on selected samples of on-site soils indicated a sulfate content of up to 0.23 percent by weight. Based on the following 2003 IBC table, the on-site soils are considered to be severely deleterious to concrete.

Table 9 – Requirements for Concrete Exposed to Sulfate-Containing Soil

Sulfate Exposure	Water-Soluble Sulfate (SO ₄) in Soil, Percentage by Weight	Cement Type	Maximum Water-Cementitious Materials Ratio, by Weight, Normal-Weight Aggregate Concrete ¹	Minimum f'_c , Normal-Weight and Lightweight Aggregate Concrete, psi
				x 0.00689 for MPa
Negligible	0.00 - 0.10	--	--	--
Moderate ²	0.10 - 0.20	II, IP(MS), IS (MS)	0.50	4,000
Severe	0.20 - 2.00	V	0.45	4,500
Very severe	Over 2.00	V plus pozzolan ³	0.45	4,500
¹ A lower water-cementitious materials ratio or higher strength may be required for low permeability or for protection against corrosion of embedded items or freezing and thawing (Table 19-A-2). ² Seawater. ³ Pozzolan that has been determined by test or service record to improve sulfate resistance when used in concrete containing Type V cement.				

We recommend that concrete in contact with on-site soils, along with subsurface walls up to 12 inches above finished grade, contain Type V cement with a water-cement ratio of 0.45 or less by weight and a design compressive strength of 4,500 or more pounds per square inch (psi). In addition, it is recommended that reinforcing bars within concrete, which is in contact with the soil, be covered by approximately 3 inches of concrete. Concrete should be placed with an approximate 4-inch slump and good densification procedures should be used during placement to reduce possible honeycombing. The slump should be tested at the site by the geotechnical consultant. Structural concrete should be placed in accordance with American Concrete Institute (ACI, 2005) and project specifications. We also recommend that concrete masonry unit (CMU) blocks, if utilized for the project, be constructed with Type V cement.

8.9.2. Buried Metal Pipes

Results of chemical tests indicate laboratory resistivity test results performed on representative samples of on-site soils indicate electrical resistivity values as low as

approximately 310 Ohm-centimeters (Ohm-cm) at saturated moisture contents, which is considered to be very severely corrosive to buried metals. We recommend that corrosion reduction methods be implemented for this project for buried metal pipes. These corrosion reduction methods may include utilization of protective coatings, pipe sleeving, and/or appropriate cathodic protection, as recommended by a qualified corrosion engineer. Where permitted by local building codes, the use of polyvinyl chloride (PVC) pipes should also be considered.

8.10. Moisture Infiltration Reduction and Surface Drainage

Infiltration of water into the subsurface soils can lead to soil movement and associated distress, and chemically related deterioration of concrete structures. To reduce the potential for infiltration of moisture into subsurface soils at the site, we recommend the following:

- Consideration is being given to utilizing planter areas in parking lots to handle surface runoff during rainstorms by constructing percolation basins. Areas to be used as percolation basins should not be constructed within approximately 50 feet of or adjacent to building foundations.
- Positive drainage should be established and maintained away from the on-site buildings. Positive drainage may be established by providing a surface gradient away from buildings of 2 or more percent for a distance of 5 or more feet away from a structure's perimeter.
- Adequate surface drainage should be provided to direct surface water away from on-site structures and to a suitable outlet such as a storm drain or the street. Adequate surface drainage may be enhanced by utilization of graded swales, area drains, and other drainage devices. Surface runoff should not be allowed to pond near structures.
- Roof drain downspouts should be tightlined to an appropriate outlet such as a storm drain or the street. If tightlining of the downspouts is not practicable, they should discharge 5 feet or more away from the buildings or onto flatwork that slopes away from the structures. Downspouts should not be allowed to discharge onto the ground surface adjacent to the building foundations.
- Irrigation heads should be oriented so that they spray away from building and block wall surfaces. Irrigation should be maintained at the lowest level needed for plant growth.

- Ninyo & Moore recommends that low water use (desert-type) landscaping be utilized on site, particularly within 5 feet of the proposed buildings and exterior site improvements, including areas of concrete flatwork and masonry block walls.
- Utility line trenches within the building pads, including 5 feet beyond the building edges, should be backfilled with on-site derived soil or an equivalent in gradation import. To reduce the potential for migration of subsurface water beneath the buildings, granular clean soils should not be used as trench backfill.

8.11. Observation and Testing

A qualified representative of the owner should perform appropriate observation and testing services during grading and construction operations. These services should include evaluation of subgrade conditions where soil removals/excavations are performed, and observation and testing of concrete, structural masonry, structural steel, and steel reinforcement. The depth of removal of undocumented fill, soft, loose, porous, or otherwise unsuitable soils, as well as observe and test the placement and compaction of structural fill and utility trench backfill soils should also be evaluated. The bottoms of excavations and footing trenches should be evaluated prior to placement of soil and concrete.

8.12. Plan Review

The recommendations presented in this report are based on preliminary design information for the proposed project, as provided by RTKL Associates, and on the findings of our geotechnical evaluation. When completed, project plans and specifications should be reviewed by the geotechnical consultant prior to submitting the plans and specifications for bid. Additional field exploration and laboratory testing may be needed upon review of the final project design plans.

8.13. Pre-Construction Meeting

We recommend that a pre-construction meeting be held. The owner or the owner's representative, the civil engineer, the geotechnical consultant, and the contractor should be in attendance to discuss the plans, geotechnical report, and the project.

9. LIMITATIONS

The field evaluation, laboratory testing, and geotechnical analyses presented in this geotechnical report have been conducted in general accordance with current practice and the standard of care exercised by geotechnical consultants performing similar tasks in the project area. No warranty, expressed or implied, is made regarding the conclusions, recommendations, and opinions presented in this report. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this report may be encountered during construction. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface evaluation will be performed upon request. Please also note that our evaluation was limited to assessment of the geotechnical aspects of the project, and did not include evaluation of structural issues, environmental concerns, or the presence of hazardous materials.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document.

This report is intended for design purposes only. It does not provide sufficient data to prepare an accurate bid by contractors. It is suggested that the bidders and their geotechnical consultant perform an independent evaluation of the subsurface conditions in the project areas. The independent evaluations may include, but not be limited to, review of other geotechnical reports prepared for the adjacent areas, site reconnaissance, and additional exploration and laboratory testing.

Our conclusions, recommendations, and opinions are based on an analysis of the observed site conditions. If geotechnical conditions different from those described in this report are encountered, our office should be notified and additional recommendations, if warranted, will be provided upon request. It should be understood that the conditions of a site could change with time as a result of natural processes or the activities of man at the subject site or nearby sites. In addition, changes to the applicable laws, regulations, codes, and standards of practice may occur

due to government action or the broadening of knowledge. The findings of this report may, therefore, be invalidated over time, in part or in whole, by changes over which Ninyo & Moore has no control.

This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

10. SELECTED REFERENCES

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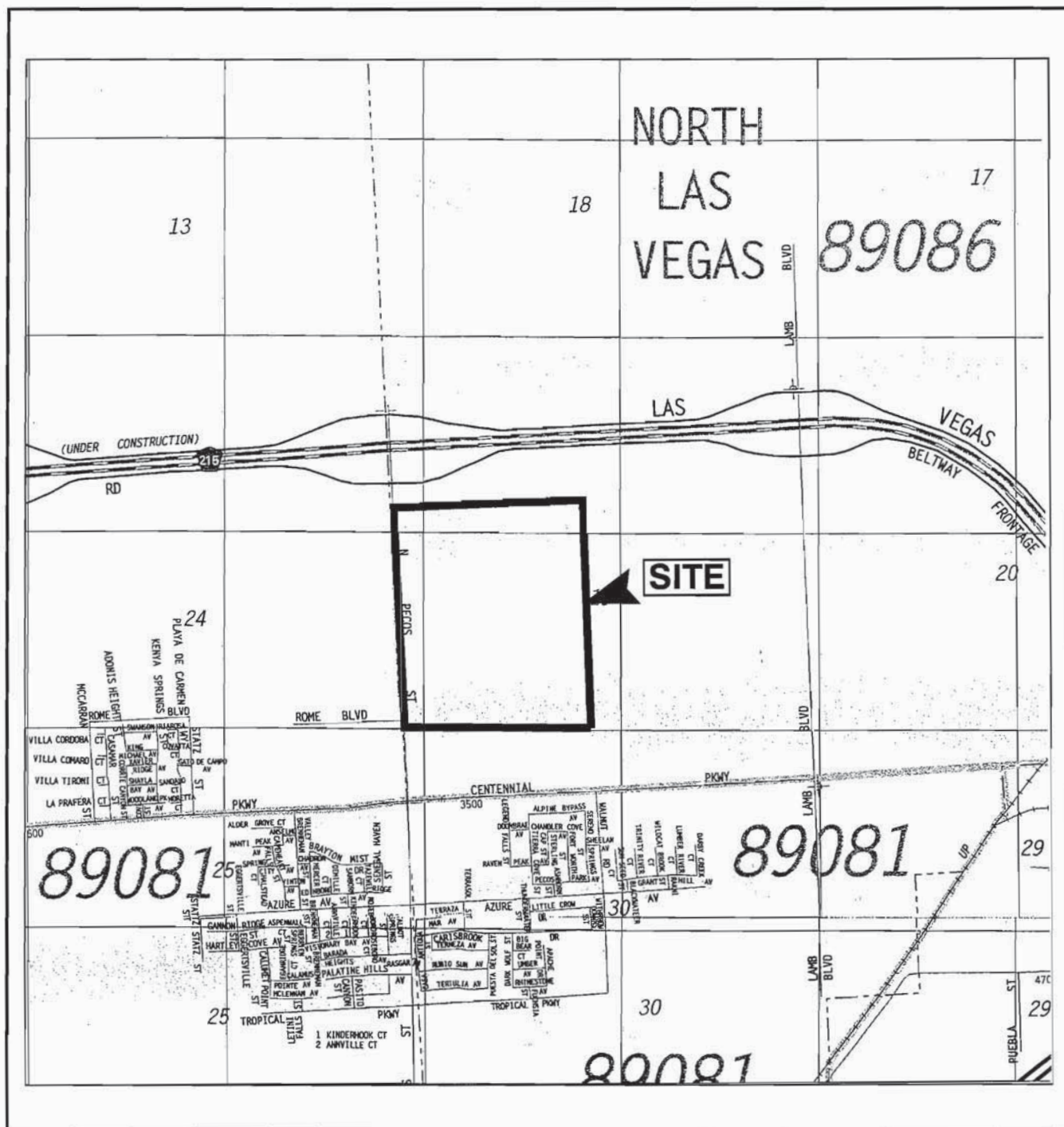
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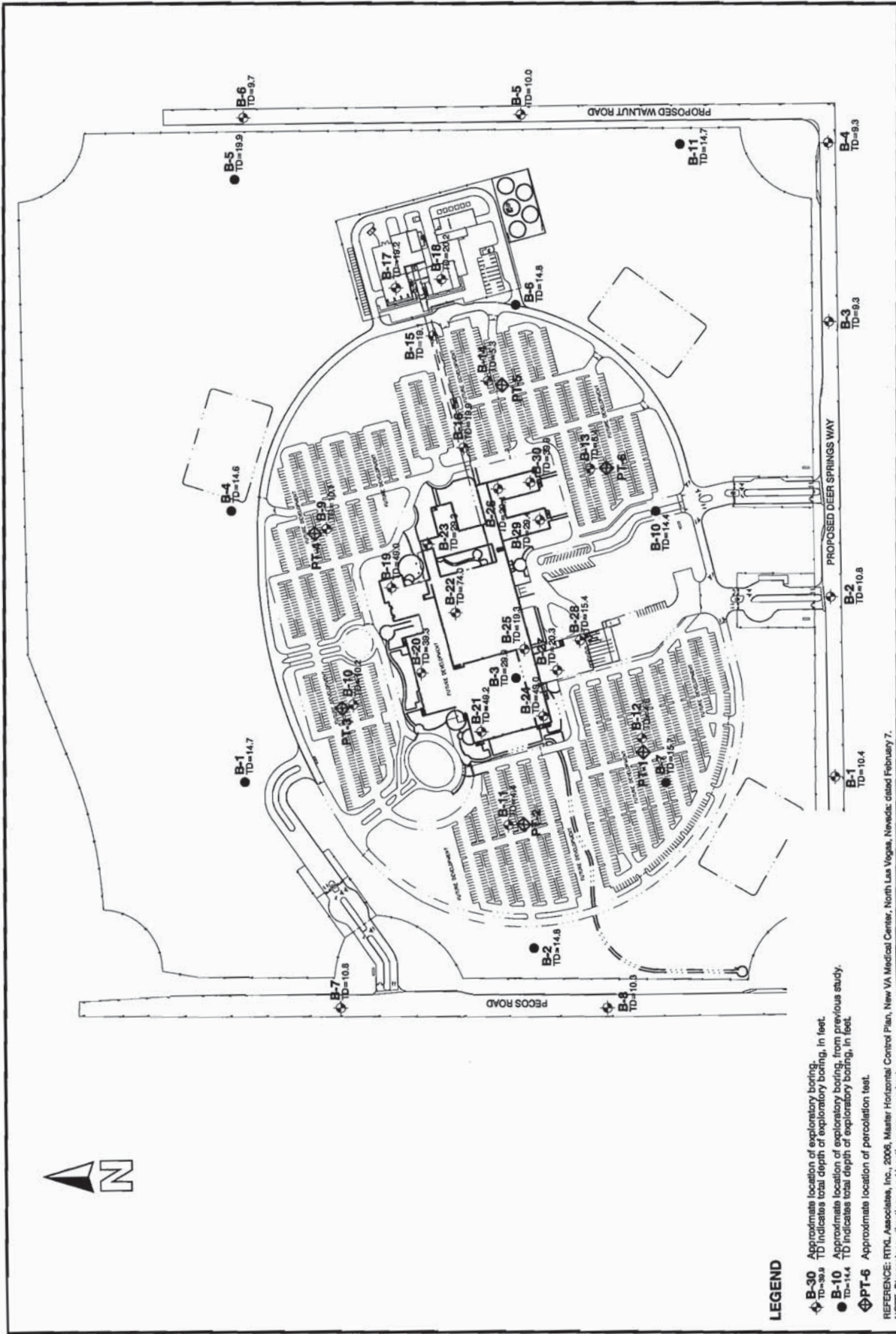


APPROXIMATE SCALE IN FEET

NOTE: Dimensions, directions, and locations are approximate.



Ninyo & Moore		SITE LOCATION MAP	FIGURE 1
PROJECT NO.	DATE	VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA	
3016990005	05/06		



<i>Ninyo & Moore</i>		BORING LOCATION MAP		FIGURE 2
PROJECT NO.		DATE		
301699005		05/06		

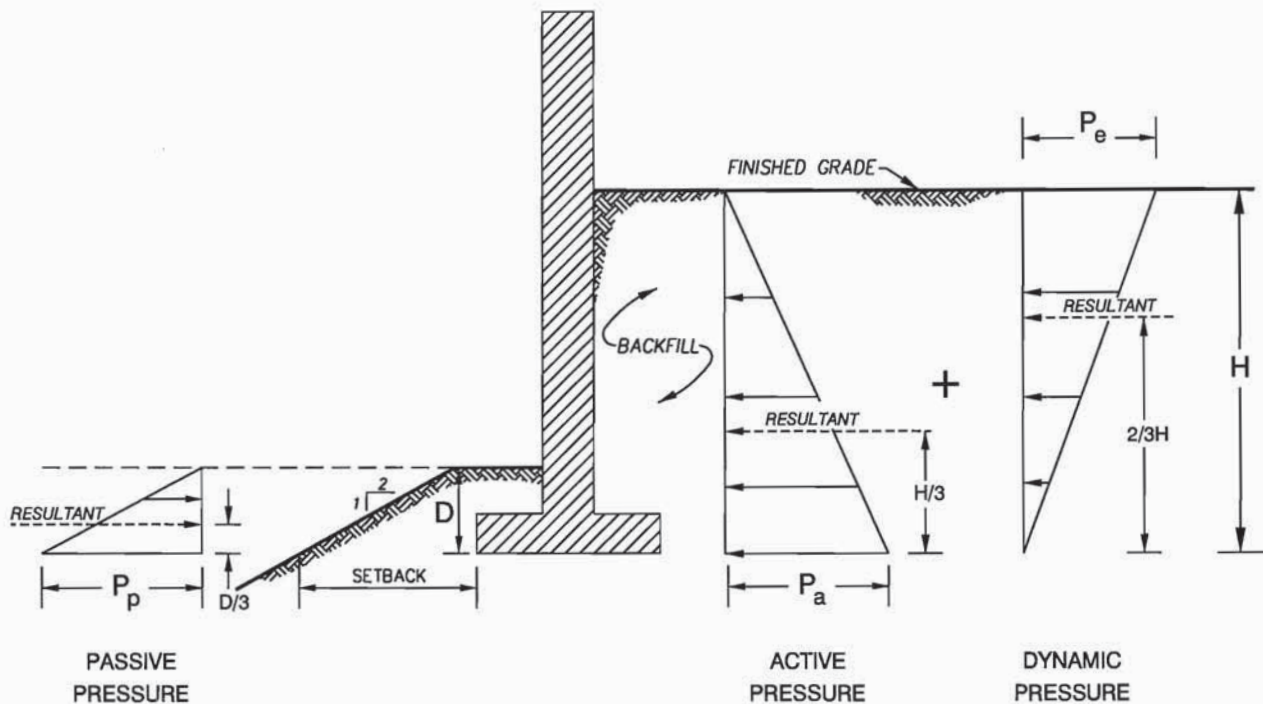
APPROXIMATE SCALE

0

400

800 FEET

NOTE: Dimensions, directions, and locations are approximate.



NOTES:

1. ASSUMES NO HYDROSTATIC PRESSURE BUILD-UP BEHIND THE RETAINING WALL.
2. GRANULAR BACKFILL MATERIALS SHOULD BE USED FOR RETAINING WALL.
3. DRAINS AS RECOMMENDED IN THE RETAINING WALL DRAINAGE DETAIL SHOULD BE INSTALLED BEHIND THE RETAINING WALL.
4. DYNAMIC LATERAL EARTH PRESSURE IS BASED ON AN EFFECTIVE PEAK GROUND ACCELERATION OF 0.10g
5. H AND D ARE IN FEET
6. SETBACK SHOULD BE IN ACCORDANCE WITH SECTION 1805.3 OF THE IBC (2003)

RECOMMENDED GEOTECHNICAL DESIGN PARAMETERS

Lateral Earth Pressure	Equivalent Fluid Pressure (lb/ft ² /ft) ⁽¹⁾
P_a	Level Backfill with Granular Soils ⁽²⁾
	37H
P_e	8H
P_p	Level Ground
	270D

NOT TO SCALE

Ninyo & Moore

LATERAL EARTH PRESSURES FOR YIELDING RETAINING WALLS

FIGURE

PROJECT NO.

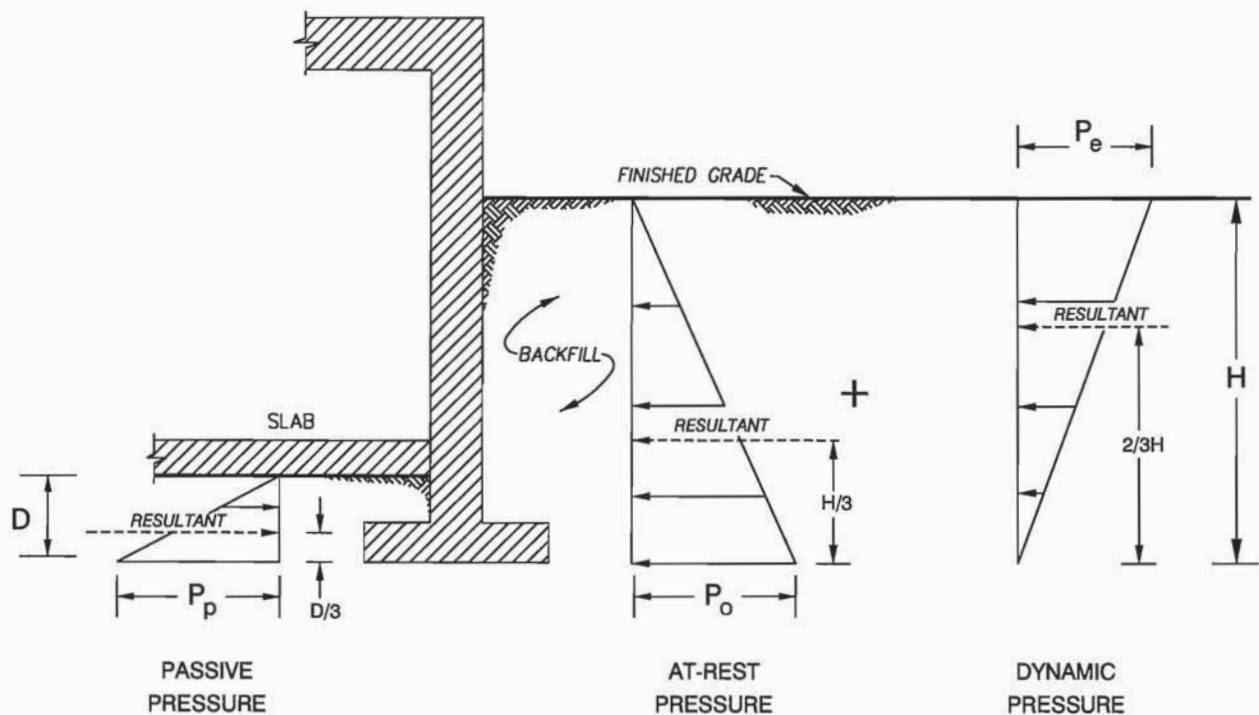
DATE

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VETERANS AFFAIRS MEDICAL CENTER
NORTH LAS VEGAS, NEVADA

3



NOTES:

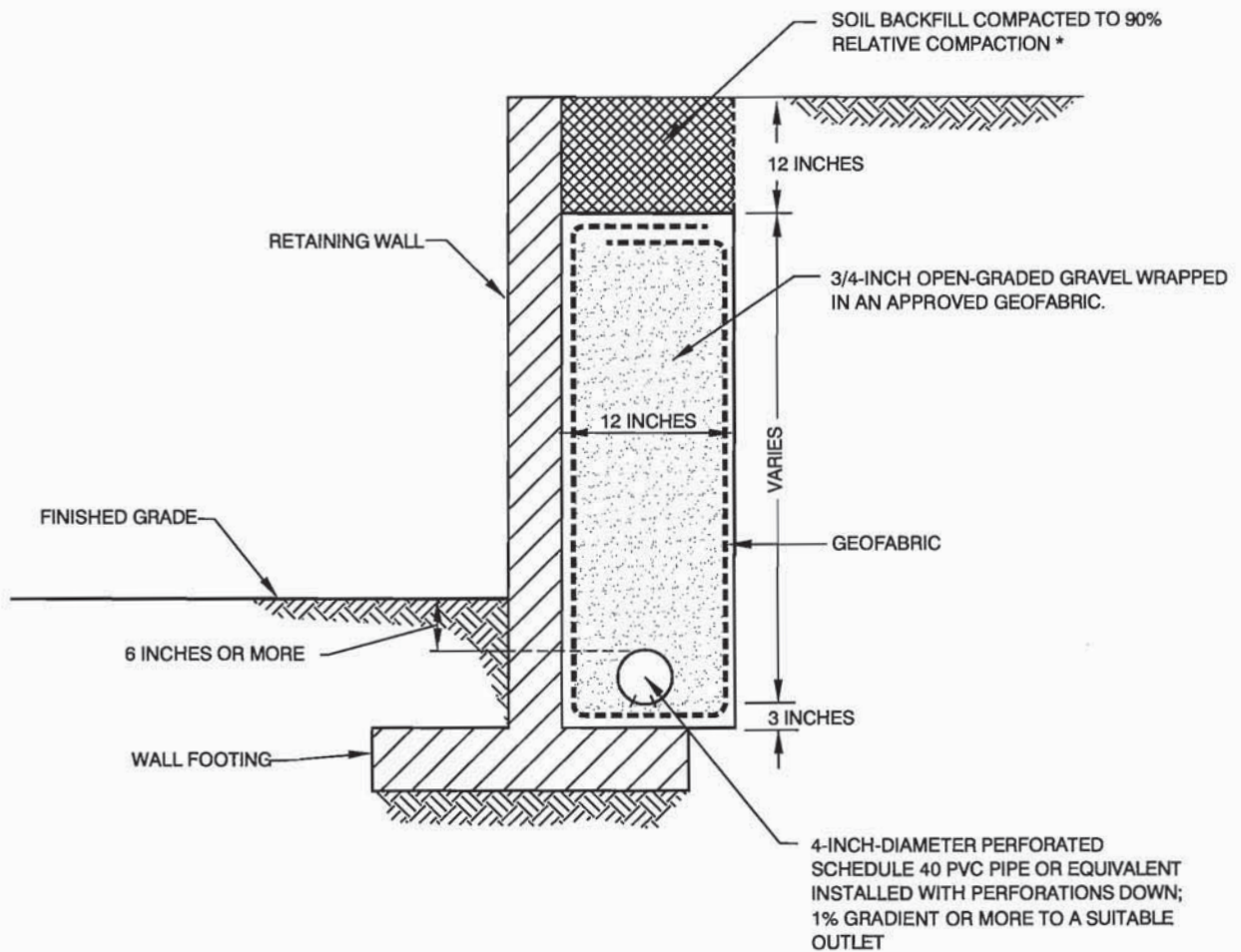
1. ASSUMES NO HYDROSTATIC PRESSURE BUILD-UP BEHIND THE RETAINING WALL.
2. GRANULAR BACKFILL MATERIALS SHOULD BE USED FOR RETAINING WALL.
3. DRAINS AS RECOMMENDED IN THE RETAINING WALL DRAINAGE DETAIL SHOULD BE INSTALLED BEHIND THE RETAINING WALL.
4. DYNAMIC LATERAL EARTH PRESSURE IS BASED ON AN EFFECTIVE PEAK GROUND ACCELERATION OF 0.20g
5. H AND D ARE IN FEET

RECOMMENDED GEOTECHNICAL DESIGN PARAMETERS

Lateral Earth Pressure	Equivalent Fluid Pressure (lb/ft ² /ft) ⁽¹⁾
P _O	Level Backfill with Granular Soils ⁽²⁾
	57H
P _e	17H
P _p	Level Ground
	270D

NOT TO SCALE

Ningo & Moore		LATERAL EARTH PRESSURES FOR RESTRAINED RETAINING WALLS	FIGURE
PROJECT NO.	DATE	VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA	4
301699005	05/06		



*BASED ON ASTM D1557

NOT TO SCALE

NOTE: AS AN ALTERNATIVE, AN APPROVED GEOCOMPOSITE DRAIN SYSTEM MAY BE USED.

Ninyo & Moore		RETAINING WALL DRAINAGE DETAIL	FIGURE
PROJECT NO.	DATE	VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA	5
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APPENDIX A**Field Sampling Procedures and Exploratory Boring Logs****Disturbed Samples**

Bulk samples of representative earth materials were obtained from the exploratory borings. The samples were bagged and transported to the laboratory for testing.

Relatively Undisturbed Samples

Relatively undisturbed soil samples were obtained in the field using the modified split-barrel drive sampler. The sampler, with an external diameter of 3.0 inches, is lined with 1-inch long thin brass rings with inside diameters of approximately 2.4 inches. The sample barrel is driven into the ground with the weight of a hammer in general accordance with ASTM D 3550-84. The driving weight is permitted to fall freely. The approximate length of the fall, the weight of the hammer, and the number of blows per foot of driving are presented on the boring logs as an index to the relative resistance of the sampled materials. The samples are removed from the sample barrel in the brass rings, sealed, and transported to the laboratory for testing.


U.S.C.S. METHOD OF SOIL CLASSIFICATION			
MAJOR DIVISIONS		SYMBOL	TYPICAL NAMES
COARSE-GRAINED SOILS (More than 1/2 of soil >No. 200 sieve size)	GRAVELS (More than 1/2 of coarse fraction > No. 4 sieve size)	GW	Well graded gravels or gravel-sand mixtures little or no fines
		GP	Poorly graded gravels or gravel-sand mixtures, little or no fines
		GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS (More than 1/2 of coarse fraction <No. 4 sieve size)	SW	Well graded sands or gravelly sands, little or no fines
		SP	Poorly graded sands or gravelly sands, little or no fines
		SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (More than 1/2 of soil <No. 200 sieve size)	SILTS & CLAYS Liquid Limit <50	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL	Organic silts and organic silty clays of low plasticity
	SILTS & CLAYS Liquid Limit >50	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity, organic silty clays, organic silts
HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils

GRAIN SIZE CHART		
CLASSIFICATION	RANGE OF GRAIN SIZES	
	U.S. Standard Sieve Size	Grain Size in Millimeters
BOULDERS	Above 12"	Above 305
COBBLES	12" to 3"	305 to 76.2
GRAVEL	3" to No. 4	76.2 to 4.76
	3" to 3/4"	76.2 to 19.1
	3/4" to No. 4	19.1 to 4.76
SAND	No. 4 to No. 200	4.76 to 0.074
	No. 4 to No. 10	4.76 to 2.00
	No. 10 to No. 40	2.00 to 0.420
	No. 40 to No. 200	0.420 to 0.074
SILT & CLAY	Below No. 200	Below 0.074

Hardness of Caliche*	
Descriptive Term	Characteristics
Moderately Hard	Can be scratched with a knife with light to moderate pressure; breaks with moderate hammer blow.
Hard	Can be scratched with a knife with difficulty; can be broken with heavy hammer blow.
Very Hard	Cannot be scratched with a knife; can only be broken with repeated heavy hammer blows.
* Rock-like cemented soil	

Ninyo & Moore	SOIL CLASSIFICATION
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DEPTH (feet)	Bulk Driven	SAMPLES	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	BORING LOG EXPLANATION SHEET
0								<p>Bulk sample.</p> <p>Modified split-barrel drive sampler.</p> <p>No recovery with modified split-barrel drive sampler.</p> <p>Sample retained by others.</p> <p>Standard Penetration Test (SPT).</p> <p>No recovery with a SPT.</p> <p>Shelby tube sample. Distance pushed in inches/length of sample recovered in inches.</p> <p>No recovery with Shelby tube sampler.</p> <p>Continuous Push Sample.</p> <p>Seepage.</p> <p>Groundwater encountered during drilling.</p> <p>Groundwater measured after drilling.</p>
5			XX/XX					
10								
							SM	<p>ALLUVIUM:</p> <p>Solid line denotes unit change.</p> <p>Dashed line denotes material change.</p>
15								<p>Attitudes: Strike/Dip</p> <p>b: Bedding</p> <p>c: Contact</p> <p>j: Joint</p> <p>f: Fracture</p> <p>F: Fault</p> <p>cs: Clay Seam</p> <p>s: Shear</p> <p>bss: Basal Slide Surface</p> <p>sf: Shear Fracture</p> <p>sz: Shear Zone</p> <p>sbs: Sheared Bedding Surface</p>
20								<p>The total depth line is a solid line that is drawn at the bottom of the boring.</p>




BORING LOG

EXPLANATION OF BORING LOG SYMBOLS


PROJECT NO.	DATE Rev. 01/03	FIGURE
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DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>03/01/06</u> BORING NO. <u>B-1</u> GROUND ELEVATION <u>2,049± (NAVD '83)</u> SHEET <u>1</u> OF <u>1</u> METHOD OF DRILLING <u>Mobile B-60 hollow-stem auger drill rig</u> DRIVE WEIGHT <u>140 lbs. (spooling cable)</u> DROP <u>30"</u> SAMPLED BY <u>SJG</u> LOGGED BY <u>SJG</u> REVIEWED BY <u>EDE</u>		
							DESCRIPTION/INTERPRETATION		
0		6/6" 50/2"				SM	<u>ALLUVIUM:</u> Brown, damp, loose to medium dense, silty SAND with fine and coarse gravel. Very dense; sampler refusal after 8".		
5		50/2"					Sampler refusal after 8".		
10		50/5"	8.1	65.0		CL	Brown, damp, very stiff, lean CLAY; slightly cemented.		
15							Sampler refusal after 4". Total depth - 10.4 feet. Groundwater not encountered during drilling. Backfilled on 03/01/06.		
20									




BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-1

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>03/01/06</u> BORING NO. <u>B-2</u> GROUND ELEVATION <u>2,034± (NAD '83)</u> SHEET <u>1</u> OF <u>1</u> METHOD OF DRILLING <u>Mobile B60 hollow-stem auger drill rig</u> DRIVE WEIGHT <u>140 lbs. (spooling cable)</u> DROP <u>30"</u> SAMPLED BY <u>SJG</u> LOGGED BY <u>SJG</u> REVIEWED BY <u>EDE</u> DESCRIPTION/INTERPRETATION		
							0		12/6" 29/6" 50/4"
5		18/6" 41/6" 50/3"	4.2	86.3			Sampler refusal after 15".		
						CL	Brown, damp, very stiff, lean CLAY with sand; few fine gravel.		
10		33/6" 50/3"	8.2	--			Sampler refusal after 9". Total depth = 10.8 feet. Groundwater not encountered during drilling. Backfilled on 03/01/06.		
15									
20									




BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-2

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED	BORING NO.				
							03/01/06	B-3				
							GROUND ELEVATION	2,029± (NAD '83)	SHEET	1	OF	1
							METHOD OF DRILLING			Mobile B60 hollow-stem auger drill rig		
							DRIVE WEIGHT	140 lbs. (spooling cable)	DROP	30"		
							SAMPLED BY	SJG	LOGGED BY	SJG	REVIEWED BY	EDE
							DESCRIPTION/INTERPRETATION					
0		17/6" 50/5"				GM	<u>ALLUVIUM:</u> Brown, damp, loose to medium dense, silty GRAVEL with sand. Very dense; sampler refusal after 11".					
5		42/6" 50/3"					Sampler refusal after 9".					
10		50/3"	1.6	--		CL	Brown, damp, very stiff, lean CLAY with sand; few gravel; slightly cemented. Sampler refusal after 3". Total depth = 9.3 feet. Groundwater not encountered during drilling. Backfilled on 03/01/06.					
15												
20												



BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-3

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED	BORING NO.				
							03/01/06	B-4				
							GROUND ELEVATION	2,034± (NAD '83)	SHEET	1	OF	1
							METHOD OF DRILLING			Mobile B60 hollow-stem auger drill rig		
							DRIVE WEIGHT	140 lbs. (spooling cable)	DROP	30"		
							SAMPLED BY	SJG	LOGGED BY	SJG	REVIEWED BY	EDE
							DESCRIPTION/INTERPRETATION					
0		7/6" 8/6" 8/6"	0.7	-		GM	<u>ALLUVIUM:</u> Brown, damp, loose to medium dense, silty GRAVEL with sand. Very dense. Sampler refusal after 4".					
5		50/4"										
10		50/4"				CL	Brown, damp, very stiff, lean CLAY with gravel; slightly cemented. Sampler refusal after 4". Total depth = 9.3 feet. Groundwater not encountered during drilling. Backfilled on 03/01/06.					
15												
20												



BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-4


DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>03/02/06</u> BORING NO. <u>B-5</u> GROUND ELEVATION <u>2,058± (NAD '83)</u> SHEET <u>1</u> OF <u>1</u> METHOD OF DRILLING <u>Mobile B60 hollow-stem auger drill rig</u> DRIVE WEIGHT <u>140 lbs. (spooling cable)</u> DROP <u>30"</u> SAMPLED BY <u>SJG</u> LOGGED BY <u>SJG</u> REVIEWED BY <u>EDE</u>		
							DESCRIPTION/INTERPRETATION		
0		33/6" 50/1"	1.8	103.3		GC-GM	ALLUVIUM: Brown, damp, loose to medium dense, clayey silty GRAVEL with sand. Very dense; sampler refusal after 7".		
5		50/2"					Sampler refusal after 2".		
10		50/2"				CL	Brown, damp, very stiff, lean CLAY with gravel; slightly cemented. Sampler refusal after 2".		
15							Total depth = 10.0 feet. Groundwater not encountered during drilling. Backfilled on 03/02/06.		
20									

BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-5


DEPTH (feet)	SAMPLES		BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>03/02/06</u> BORING NO. <u>B-6</u> GROUND ELEVATION <u>2,081'± (NAD '83)</u> SHEET <u>1</u> OF <u>1</u> METHOD OF DRILLING <u>Mobile B60 hollow-stem auger drill rig</u> DRIVE WEIGHT <u>140 lbs. (spooling cable)</u> DROP <u>30"</u> SAMPLED BY <u>SJG</u> LOGGED BY <u>SJG</u> REVIEWED BY <u>EDE</u>	
	Bulk	Driven						DESCRIPTION/INTERPRETATION	
0			7/6" 21/6" 42/6"	0.8	109.3		GM	ALLUVIUM: Brown, damp, loose to medium dense, silty GRAVEL with sand. Dense. Very dense; sampler refusal after 5".	
5			50/5"	3.5	-		CL	Brown, damp, very stiff, lean CLAY with gravel; slightly cemented. Sampler refusal after 8". Total depth = 9.7 feet. Groundwater not encountered during drilling. Backfilled on 03/02/06.	
10			32/6" 50/2"						
15									
20									


BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-6

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED 03/02/06 BORING NO. B-7	
							GROUND ELEVATION (2,065'± (NAD '83) SHEET 1 OF 1	
METHOD OF DRILLING Mobile B60 hollow-stem auger drill rig							DRIVE WEIGHT 140 lbs. (spooling cable) DROP 30"	
SAMPLED BY SJG LOGGED BY SJG REVIEWED BY EDE							DESCRIPTION/INTERPRETATION	
0		11/6" 24/6" 48/6"	1.6	99.8		GM	ALLUVIUM: Brown, damp, loose to medium dense, silty GRAVEL with sand. Very dense.	
5	✕	50/4"					Sampler refusal after 4".	
10		40/6" 50/3"	3.9	90.5		CL	Brown, damp, very stiff, lean CLAY with sand and gravel; slightly cemented.	
15							Sampler refusal after 9". Total depth = 10.8 feet. Groundwater not encountered during drilling. Backfilled on 03/02/06.	
20								




BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-7

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>03/02/06</u> BORING NO. <u>B-8</u> GROUND ELEVATION <u>2,047± (NAD '83)</u> SHEET <u>1</u> OF <u>1</u> METHOD OF DRILLING <u>Mobile B50 hollow-stem auger drill rig</u> DRIVE WEIGHT <u>140 lbs. (spooling cable)</u> DROP <u>30"</u> SAMPLED BY <u>SJG</u> LOGGED BY <u>SJG</u> REVIEWED BY <u>EDE</u> DESCRIPTION/INTERPRETATION		
							0		9/6" 16/6" 23/6"
5		17/6" 24/6" 37/6"	9.7	89.2		CL	Brown, damp, very stiff, lean CLAY with sand; trace fine gravel. Decrease in sand and gravel.		
10		50/3"	4.4	88.8			Sampler refusal after 3". Total depth = 10.3 feet. Groundwater not encountered during drilling. Backfilled on 03/02/06.		
15									
20									




BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-8

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>03/02/06</u> BORING NO. <u>B-9</u> GROUND ELEVATION <u>2,078'± (NAD '83)</u> SHEET <u>1</u> OF <u>1</u> METHOD OF DRILLING <u>Mobile B60 hollow-stem auger drill rig</u> DRIVE WEIGHT <u>140 lbs. (spooling cable)</u> DROP <u>30"</u> SAMPLED BY <u>SJG</u> LOGGED BY <u>SJG</u> REVIEWED BY <u>EDE</u>		
							DESCRIPTION/INTERPRETATION		
0		15/6" 50/5"	0.9	119.2		GC-GM	<u>ALLUVIUM:</u> Brown, damp, loose to medium dense, clayey, silty GRAVEL with sand. Very dense; sampler refusal after 11".		
5		50/3"					Sampler refusal after 3".		
10		50/1"					Sampler refusal after 1". Total depth = 10.1 feet. Groundwater not encountered during drilling. Backfilled on 03/02/06.		
15									
20									



BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-9

DEPTH (feet)	SAMPLES		BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED 03/02/06 BORING NO. B-10	
	Bulk	Driven						GROUND ELEVATION 2,058± (NAD '83) SHEET 1 OF 1	METHOD OF DRILLING Mobile B60 hollow-stem auger drill rig
								DRIVE WEIGHT 140 lbs. (spooling cable) DROP 30"	SAMPLED BY SJG LOGGED BY SJG REVIEWED BY EDE
								DESCRIPTION/INTERPRETATION	
0			8/6" 23/6" 27/6"	1.5	88.1		GM	<u>ALLUVIUM:</u> Brown, damp, loose to medium dense, silty GRAVEL with sand.	
5			50/3"					Very dense. Sampler refusal after 3".	
10			50/2"					Sampler refusal after 2". Total depth = 10.2 feet. Groundwater not encountered during drilling. Backfilled on 03/02/06.	
15									
20									




BORING LOG

VETERANS AFFAIRS MEDICAL CENTER
NORTH LAS VEGAS, NEVADA


PROJECT NO. 301699005	DATE 05/06	FIGURE A-10
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DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>02/28/06</u> BORING NO. <u>B-11</u> GROUND ELEVATION <u>2,052± (NAD '83)</u> SHEET <u>1</u> OF <u>1</u> METHOD OF DRILLING <u>Mobile B60 hollow-stem auger drill rig</u> DRIVE WEIGHT <u>140 lbs. (cathead)</u> DROP <u>30"</u> SAMPLED BY <u>SJG</u> LOGGED BY <u>SJG</u> REVIEWED BY <u>EDE</u>		
							DESCRIPTION/INTERPRETATION		
0		4/6" 7/6" 37/6"	1.1	124.3		GM	<u>ALLUVIUM:</u> Brown, damp, loose to medium dense, silty GRAVEL with sand. Very dense. Sampler refusal after 5". Total depth = 4.4 feet. Groundwater not encountered during drilling. Backfilled on 02/28/06.		
5		50/5"							
10									
15									
20									





BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-11

DEPTH (feet)	SAMPLES		BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>02/28/06</u> BORING NO. <u>B-12</u> GROUND ELEVATION <u>2,039± (NAD '83)</u> SHEET <u>1</u> OF <u>1</u> METHOD OF DRILLING <u>Mobile B60 hollow-stem auger drill rig</u> DRIVE WEIGHT <u>140 lbs. (cathead)</u> DROP <u>30"</u> SAMPLED BY <u>SJG</u> LOGGED BY <u>SJG</u> REVIEWED BY <u>EDE</u> DESCRIPTION/INTERPRETATION		
	Bulk	Driven								
0			2/6" 20/6" 40/6"	1.9	-		SM	<u>ALLUVIUM:</u> Brown, damp, loose to medium dense, silty SAND with fine and coarse gravel. Dense. Very dense. Sampler refusal after 5". Total depth = 4.4 feet. Groundwater not encountered during drilling. Backfilled on 02/28/06.		
5			50/5"	7.3	85.8					
10										
15										
20										





BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-12

DEPTH (feet)	SAMPLES		BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>03/01/06</u> BORING NO. <u>B-13</u> GROUND ELEVATION <u>2,055± (NAD '83)</u> SHEET <u>1</u> OF <u>1</u> METHOD OF DRILLING <u>Mobile B60 hollow-stem auger drill rig</u> DRIVE WEIGHT <u>140 lbs. (spooling cable)</u> DROP <u>30"</u> SAMPLED BY <u>SJG</u> LOGGED BY <u>SJG</u> REVIEWED BY <u>EDE</u>		
	Bulk	Driven						DESCRIPTION/INTERPRETATION		
0			12/6" 50/5"	1.1	110.6		GM	<u>ALLUVIUM:</u> Brown, damp, loose to medium dense, silty GRAVEL with sand. Very dense; sampler refusal after 11".		
5			50/5"	--	--			Sampler refusal after 5". Total depth = 5.4 feet. Groundwater not encountered during drilling. Backfilled on 03/01/06.		
10										
15										
20										




BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-13

DEPTH (feet)	SAMPLES		BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>03/01/06</u> BORING NO. <u>B-14</u> GROUND ELEVATION <u>2,053± (NAD '83)</u> SHEET <u>1</u> OF <u>1</u> METHOD OF DRILLING <u>Mobile B60 hollow-stem auger drill rig</u> DRIVE WEIGHT <u>140 lbs. (spooling cable)</u> DROP <u>30"</u> SAMPLED BY <u>SJG</u> LOGGED BY <u>SJG</u> REVIEWED BY <u>EDE</u>		
	Bulk	Driven						DESCRIPTION/INTERPRETATION		
0			19/6" 40/6" 50/5"	1.0	125.8		GM	<u>ALLUVIUM:</u> Brown, damp, loose to medium dense, silty GRAVEL with sand. Very dense; sampler refusal after 17".		
5			50/3"							
10										
15										
20										



BORING LOG		
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PROJECT NO. 301699005	DATE 05/06	FIGURE A-14

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>02/27/06</u> BORING NO. <u>B-15</u> GROUND ELEVATION <u>2,058± (NAD '83)</u> SHEET <u>1</u> OF <u>2</u> METHOD OF DRILLING <u>CME 85 hollow-stem auger drill rig</u> DRIVE WEIGHT <u>140 lbs. (auto trip hammer)</u> DROP <u>30"</u> SAMPLED BY <u>MAB</u> LOGGED BY <u>MAB</u> REVIEWED BY <u>EDE</u> DESCRIPTION/INTERPRETATION		
							0		8/6" 28/6" 50/5"
5		28/6" 50/5"	2.2	118.3	Sampler refusal after 11".				
10		50/4"			Sampler refusal after 4".				
15		50/4"				CL	Brown, damp, very stiff, lean CLAY with gravel; slightly cemented. Sampler refusal after 4".		
20		50/1"					Slightly gypsiferous; sampler refusal after 1". Total depth = 19.1 feet.		

Ninyo & Moore

BORING LOG


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NORTH LAS VEGAS, NEVADA

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FIGURE
A-15

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>02/27/06</u> BORING NO. <u>B-16</u> GROUND ELEVATION <u>2,055± (NAD '83)</u> SHEET <u>1</u> OF <u>2</u> METHOD OF DRILLING <u>CME 85 hollow-stem auger drill rig</u> DRIVE WEIGHT <u>140 lbs. (auto trip hammer)</u> DROP <u>30"</u> SAMPLED BY <u>MAB</u> LOGGED BY <u>MAB</u> REVIEWED BY <u>EDE</u>		
							DESCRIPTION/INTERPRETATION		
0		9/6" 50/5"	2.6	107.5		GM	<u>ALLUVIUM:</u> Brown, damp, loose to medium dense, silty GRAVEL with sand. Very dense; sampler refusal after 11".		
5		50/3"					Sampler refusal after 3".		
10		17/6" 35/6" 50/6"	7.5	98.8		CL	Brown, damp, very stiff, lean CLAY with gravel; slightly cemented.		
15		50/5"					Trace gravel; slightly gypsiferous; sampler refusal after 5".		
20		48/6" 50/5"	6.4	101.7		GC	Brown, damp, very dense, silty GRAVEL with sand.		
							Sampler refusal after 11".		




BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-17

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED 02/27/06 BORING NO. B-17	
							GROUND ELEVATION 2,062± (NAD '83) SHEET 1 OF 2	
METHOD OF DRILLING CME 85 hollow-stem auger drill rig							DRIVE WEIGHT 140 lbs. (auto trip hammer) DROP 30"	
SAMPLED BY MAB LOGGED BY MAB REVIEWED BY EDE							DESCRIPTION/INTERPRETATION	
0		7/6" 27/6" 40/6"	1.8	124.3		GM	<u>ALLUVIUM:</u> Brown, damp, loose to medium dense, silty GRAVEL with sand. Dense.	
5		25/6" 50/5"	2.2	128.3			Very dense; sampler refusal after 11".	
10		27/6" 50/5"	7.8	90.5		CL	Brown, damp, very stiff, lean CLAY with gravel; slightly cemented. Sampler refusal after 11".	
15		50/3"					Sampler refusal after 3".	
20		50/2"					Sampler refusal after 2". Total depth = 19.2 feet.	



BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-19

DEPTH (feet)	SAMPLES		BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED 02/27/06 BORING NO. B-17	
	Bulk	Driven						GROUND ELEVATION 2,062± (NAD '83) SHEET 2 OF 2	METHOD OF DRILLING CME 85 hollow-stem auger drill rig
								DRIVE WEIGHT 140 lbs. (auto trip hammer) DROP 30"	SAMPLED BY MAB LOGGED BY MAB REVIEWED BY EDE
								DESCRIPTION/INTERPRETATION	
20								Groundwater not encountered during drilling. Backfilled on 02/27/06.	
25									
30									
35									
40									




BORING LOG

VETERANS AFFAIRS MEDICAL CENTER
NORTH LAS VEGAS, NEVADA


PROJECT NO. 301699005	DATE 05/06	FIGURE A-20
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DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>03/01/06</u> BORING NO. <u>B-18</u>		
							GROUND ELEVATION <u>2,055'± (NAD '83)</u> SHEET <u>1</u> OF <u>2</u>		
METHOD OF DRILLING <u>Mobile B60 hollow-stem auger drill rig</u>							DRIVE WEIGHT <u>140 lbs. (spooling cable)</u> DROP <u>30"</u>		
SAMPLED BY <u>SJG</u> LOGGED BY <u>SJG</u> REVIEWED BY <u>EDE</u>							DESCRIPTION/INTERPRETATION		
0		8/6" 15/6" 41/6"	0.9	107.1		GM	<u>ALLUVIUM:</u> Brown, damp, loose to medium dense, silty GRAVEL with sand.		
							Very dense; sampler refusal after 2".		
5		50/2"							
10		50/3"					Sampler refusal after 3".		
						CL	Brown, moist, damp, very stiff, sandy lean CLAY with gravel; slightly cemented.		
15		50/3"	5.5	91.4			Sampler refusal after 3".		
20									




BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-21

DEPTH (feet)	SAMPLES		BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>03/01/06</u> BORING NO. <u>B-18</u> GROUND ELEVATION <u>2,055± (NAD '83)</u> SHEET <u>2</u> OF <u>2</u> METHOD OF DRILLING <u>Mobile B60 hollow-stem auger drill rig</u> DRIVE WEIGHT <u>140 lbs. (spooling cable)</u> DROP <u>30"</u> SAMPLED BY <u>SJG</u> LOGGED BY <u>SJG</u> REVIEWED BY <u>EDE</u>		
	Bulk	Driven						DESCRIPTION/INTERPRETATION		
20			50/2"				CL	<u>ALLUVIUM (continued):</u> Brown, damp, very stiff, lean CLAY; slightly cemented. Sampler refusal after 2". Total depth = 20.2 feet. Groundwater not encountered during drilling. Backfilled on 03/01/06.		
25										
30										
35										
40										




BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-22

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>02/22/06</u> BORING NO. <u>B-19</u> GROUND ELEVATION <u>2,067± (NAD '83)</u> SHEET <u>1</u> OF <u>3</u> METHOD OF DRILLING <u>CME 85 hollow-stem auger drill rig</u> DRIVE WEIGHT <u>140 lbs. (auto trip hammer)</u> DROP <u>30"</u> SAMPLED BY <u>MAB</u> LOGGED BY <u>MAB</u> REVIEWED BY <u>EDE</u> DESCRIPTION/INTERPRETATION		
							0		40/6" 50/5"
5		34/6" 50/2"	4.0	100.5			Sampler refusal after 8".		
10		32/6" 50/3"	15.1	82.8		CL	Brown, damp, very stiff, lean CLAY with gravel; trace sand; moderately to highly gypsiferous; slightly cemented. Sampler refusal after 9".		
15		50/5"	6.5	82.8			Sampler refusal after 5".		
20		16/6" 40/6"	6.9	96.7			Sampler refusal after 15".		




BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-22

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED	BORING NO.	
							02/22/06	B-19	
							GROUND ELEVATION	SHEET	OF
							2,067± (NAD '83)	2	3
							METHOD OF DRILLING CME 85 hollow-stem auger drill rig		
							DRIVE WEIGHT	DROP	
							140 lbs. (auto trip hammer)	30"	
							SAMPLED BY	LOGGED BY	REVIEWED BY
							MAB	MAB	EDE
							DESCRIPTION/INTERPRETATION		
20		50/3"				CL	<u>ALLUVIUM (continued):</u> Brown, damp, very stiff, lean CLAY; trace gravel and sand; slightly cemented.		
25		10/6" 50/5"	12.8	85.0			Sampler refusal after 11".		
30		50/5"	9.4	89.5			Sampler refusal after 5".		
35		42/6" 50/2"	6.4	107.2			Sampler refusal after 8".		
							Light brown, dry, moderately hard, CALICHE; moderately cemented; composed primarily of fine-grained materials.		
40		50/1"					Sampler refusal after 1".		



BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
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DEPTH (feet)	SAMPLES		BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>02/22/06</u> BORING NO. <u>B-19</u> GROUND ELEVATION <u>2,067± (NAD '83)</u> SHEET <u>3</u> OF <u>3</u> METHOD OF DRILLING <u>CME 85 hollow-stem auger drill rig</u> DRIVE WEIGHT <u>140 lbs. (auto trip hammer)</u> DROP <u>30"</u> SAMPLED BY <u>MAB</u> LOGGED BY <u>MAB</u> REVIEWED BY <u>EDE</u> DESCRIPTION/INTERPRETATION		
	Bulk	Driven								
40								<u>ALLUVIUM (continued):</u> Light brown, dry, moderately hard, CALICHE; moderately cemented; composed primarily of fine-grained materials.		
45								Sampler refusal after 4".		
50								Sampler refusal. Total depth = 49.0 feet. Groundwater not encountered during drilling. Backfilled on 02/22/06.		
55										
60										



BORING LOG
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NORTH LAS VEGAS, NEVADA


PROJECT NO. 301699005	DATE 05/06	FIGURE A-24
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DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>02/24/06</u> BORING NO. <u>B-20</u> GROUND ELEVATION <u>2,055± (NAD '83)</u> SHEET <u>1</u> OF <u>3</u> METHOD OF DRILLING <u>CME 85 hollow-stem auger drill rig</u> DRIVE WEIGHT <u>140 lbs. (auto trip hammer)</u> DROP <u>30"</u> SAMPLED BY <u>MAB</u> LOGGED BY <u>MAB</u> REVIEWED BY <u>EDE</u> DESCRIPTION/INTERPRETATION		
							0		15/6" 50/3"
5		18/6" 24/6" 28/6"	6.2	111.5			Medium dense.		
10		50/5"	--	--			Highly gypsiferous; sampler refusal after 5".		
15		50/5"				CL	Brown, damp, very stiff, lean CLAY; trace sand and gravel; moderately gypsiferous; slightly cemented.		
		50/5"					Sampler refusal after 5".		
20		50/5"					Light brown, dry, moderately hard, CALICHE; moderately cemented; composed primarily of fine-grained material. Sampler refusal after 5".		




BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO.	DATE	FIGURE
301699005	05/06	A-25

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED	BORING NO.	
							02/24/06	B-20	
							GROUND ELEVATION	SHEET	OF
							2,055± (NAD '83)	2	3
							METHOD OF DRILLING CME 85 hollow-stem auger drill rig		
							DRIVE WEIGHT	DROP	
							140 lbs. (auto trip hammer)	30"	
							SAMPLED BY	LOGGED BY	REVIEWED BY
							MAB	MAB	EDE
							DESCRIPTION/INTERPRETATION		
20							ALLUVIUM (continued): Light brown, dry, moderately hard, CALICHE; moderately cemented; composed primarily of fine-grained material. Brown, damp, very stiff, lean CLAY; slightly cemented.		
					CL		Light brown, dry, moderately hard, CALICHE; moderately cemented; composed primarily of fine-grained material. Sampler refusal after 14".		
25		25/6" 44/6" 50/2"	4.7	101.5			Sampler refusal after 3".		
		50/3"					Sampler refusal after 5".		
30									
		50/5"					Sampler refusal after 3". Total depth = 39.3 feet.		
35									
		50/3"							
40									



BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-26

DEPTH (feet)	SAMPLES		BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED	BORING NO.
	Bulk	Driven							
								02/24/06	B-20
								GROUND ELEVATION 2,055± (NAD '83)	SHEET 3 OF 3
								METHOD OF DRILLING CME 85 hollow-stem auger drill rig	
								DRIVE WEIGHT 140 lbs. (auto trip hammer)	DROP 30"
								SAMPLED BY MAB LOGGED BY MAB REVIEWED BY EDE	
									DESCRIPTION/INTERPRETATION
40								Groundwater not encountered during drilling. Backfilled on 02/24/06.	
45									
50									
55									
60									



BORING LOG

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PROJECT NO. 301699005	DATE 05/06	FIGURE A-27
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DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>02/24/06</u> BORING NO. <u>B-21</u> GROUND ELEVATION <u>2,075± NAD '83</u> SHEET <u>1</u> OF <u>3</u> METHOD OF DRILLING <u>CME 85 hollow-stem auger drill rig</u> DRIVE WEIGHT <u>140 lbs. (auto trip hammer)</u> DROP <u>30"</u> SAMPLED BY <u>MAB</u> LOGGED BY <u>MAB</u> REVIEWED BY <u>EDE</u>		
							DESCRIPTION/INTERPRETATION		
0		4/6" 14/6" 32/6"	1.8	124.8		GM	<u>ALLUVIUM:</u> Brown, damp, loose to medium dense, silty GRAVEL with sand.		
5		39/6" 50/3"	2.3	122.8		Very dense; sampler refusal after 9".			
10		50/5"	8.0	88.6		CL	Brown, damp, very stiff, lean CLAY with gravel; slightly cemented; highly gypsiferous. Sampler refusal after 5".		
15		50/5"	5.6	88.5		Sampler refusal after 5".			
20		45/6" 50/5"	11.9	91.0		GC	Brown, damp, very dense, clayey GRAVEL with sand. Sampler refusal after 11".		
						Sampler refusal after 11".			

BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-28


DEPTH (feet)	SAMPLES		BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>02/24/06</u> BORING NO. <u>B-21</u> GROUND ELEVATION <u>2,075± NAD '83</u> SHEET <u>2</u> OF <u>3</u> METHOD OF DRILLING <u>CME 85 hollow-stem auger drill rig</u> DRIVE WEIGHT <u>140 lbs. (auto trip hammer)</u> DROP <u>30"</u> SAMPLED BY <u>MAB</u> LOGGED BY <u>MAB</u> REVIEWED BY <u>EDE</u> DESCRIPTION/INTERPRETATION		
	Bulk	Driven								
20							GC	<u>ALLUVIUM (continued):</u> Brown, damp, very dense, clayey GRAVEL with sand; slightly cemented. Sampler refusal after 4".		
25										
							CL	Light brown, dry, moderately hard, CALICHE; moderately cemented; composed primarily of fine-grained material. Brown, damp, very stiff, lean CLAY; slightly cemented. Sampler refusal after 16".		
30										
							CL	Light brown, dry, moderately hard, CALICHE; moderately cemented; composed primarily of fine-grained material. Sampler refusal after 5".		
35										
40							CL	Sampler refusal after 4".		

BORING LOG

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NORTH LAS VEGAS, NEVADA

PROJECT NO. 301699005	DATE 05/06	FIGURE A-29
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DEPTH (feet)	SAMPLES	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED	BORING NO.	
							02/24/06	B-21	
							GROUND ELEVATION	SHEET	OF
							2,075'± NAD '83)	3	3
							METHOD OF DRILLING CME 85 hollow-stem auger drill rig		
							DRIVE WEIGHT	DROP	
							140 lbs. (auto trip hammer)	30"	
							SAMPLED BY	LOGGED BY	REVIEWED BY
							MAB	MAB	EDE
							DESCRIPTION/INTERPRETATION		
40							<u>ALLUVIUM (continued):</u> Light brown, dry, moderately hard, CALICHE; moderately cemented; composed primarily of fine-grained material. Hard; strongly cemented. Sampler refusal after 1".		
45		50/1"							
50		50/2"					Sampler refusal after 2". Total depth = 49.2 feet. Groundwater not encountered during drilling. Backfilled on 02/24/06.		
55									
60									




BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-30

DEPTH (feet)	SAMPLES		BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED 02/22/06 BORING NO. B-22	
	Bulk	Driven						GROUND ELEVATION 2,058'± (NAD '83) SHEET 1 OF 4	METHOD OF DRILLING CME 85 hollow-stem auger drill rig
								DRIVE WEIGHT 140 lbs. (auto trip hammer) DROP 30"	SAMPLED BY MAB LOGGED BY MAB REVIEWED BY EDE
								DESCRIPTION/INTERPRETATION	
0			16/6" 37/6" 50/3"	1.5	121.1		SM	ALLUVIUM: Brown, damp, loose, silty SAND; few gravel. Very dense; sampler refusal after 15".	
5			16/6" 50/5"	3.4	112.9			Sampler refusal after 11".	
10			30/6" 50/3"	9.8	80.7		CL	Brown, dense, very stiff, lean CLAY with sand; slightly cemented; highly gypsiferous. Sampler refusal after 9".	
15			10/6" 22/6" 50/5"	9.4	93.9			Sampler refusal after 17".	
20			30/6" 50/4"	8.2	94.3			Slightly porous; moderately cemented; sampler refusal after 10".	

BORING LOG
 VETERANS AFFAIRS MEDICAL CENTER
 NORTH LAS VEGAS, NEVADA


PROJECT NO. 301699005	DATE 05/06	FIGURE A-31
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DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED 02/22/06 BORING NO. B-22		
							GROUND ELEVATION 2,058'± (NAD '83) SHEET 2 OF 4		
METHOD OF DRILLING CME 85 hollow-stem auger drill rig							DRIVE WEIGHT 140 lbs. (auto trip hammer) DROP 30"		
SAMPLED BY MAB LOGGED BY MAB REVIEWED BY EDE							DESCRIPTION/INTERPRETATION		
20						CL	<u>ALLUVIUM (continued):</u> Brown, damp, very stiff, lean CLAY; trace gravel and sand; slightly to moderately cemented.		
25		32/6" 50/3"	12.1	91.0			Sampler refusal after 9".		
30		37/6" 40/6" 50/2"	7.6	92.1			Sampler refusal after 14".		
35		50/3"					Sampler refusal after 3".		
40		50/5"					Sampler refusal after 5".		




BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-32

DEPTH (feet)	SAMPLES		BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>02/22/06</u> BORING NO. <u>B-22</u> GROUND ELEVATION <u>2,058± (NAD '83)</u> SHEET <u>3</u> OF <u>4</u> METHOD OF DRILLING <u>CME 85 hollow-stem auger drill rig</u> DRIVE WEIGHT <u>140 lbs. (auto trip hammer)</u> DROP <u>30"</u> SAMPLED BY <u>MAB</u> LOGGED BY <u>MAB</u> REVIEWED BY <u>EDE</u> DESCRIPTION/INTERPRETATION		
	Bulk	Driven								
40							CL	<u>ALLUVIUM (continued):</u> Brown, damp, very stiff, lean CLAY; trace gravel and sand; slightly cemented.		
			50/2"					Sampler refusal after 2".		
45								Light brown, dry, moderately hard, CALICHE; moderately cemented; composed primarily of fine-grained material.		
							CL	Brown, damp, very stiff, lean CLAY; trace gravel and sand; slightly cemented.		
			50/4"	10.2	90.8			Sampler refusal after 4".		
50										
			50/2"					Light brown, dry, moderately hard, CALICHE; moderately cemented; composed primarily of fine-grained material.		
55										
			50/2"					Sampler refusal after 2".		
60										




BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-33

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED	BORING NO.				
							02/22/06	B-22				
							GROUND ELEVATION	2,058± (NAD '83)	SHEET	4	OF	4
							METHOD OF DRILLING			CME 85 hollow-stem auger drill rig		
							DRIVE WEIGHT	140 lbs. (auto trip hammer)	DROP	30"		
							SAMPLED BY	MAB	LOGGED BY	MAB	REVIEWED BY	EDE
							DESCRIPTION/INTERPRETATION					
60							ALLUVIUM (continued): Light brown, dry, moderately hard, CALICHE; moderately cemented; composed primarily of fine-grained material.					
		50/1"					Sampler refusal after 1".					
65												
		50/1"					Sampler refusal after 1".					
70							Hard; strongly cemented.					
		50/<1"					Sampler refusal.					
75							Total depth = 74.0 feet. Groundwater not encountered during drilling. Backfilled on 02/22/06.					
80												




BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-34

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>02/22/06</u> BORING NO. <u>B-23</u> GROUND ELEVATION <u>2,067± (NAD '83)</u> SHEET <u>1</u> OF <u>2</u> METHOD OF DRILLING <u>CME 85 hollow-stem auger drill rig</u> DRIVE WEIGHT <u>140 lbs. (auto trip hammer)</u> DROP <u>30"</u> SAMPLED BY <u>MAB</u> LOGGED BY <u>MAB</u> REVIEWED BY <u>EDE</u> DESCRIPTION/INTERPRETATION		
							0	9/6" 10/6" 16/6"	0.9
5	50/5"	1.9	111.0		Very dense; sampler refusal after 5".				
10	39/6" 50/5"	6.3	90.5	CL	Brown, damp, very stiff, lean CLAY with gravel; trace sand; moderately gypsiferous; slightly cemented. Sampler refusal after 11".				
15	50/5"				Sampler refusal after 5".				
20	42/6" 50/1"	8.6	90.5		Sampler refusal after 7".				




BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-35

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED	BORING NO.	
							02/22/06	B-23	
							GROUND ELEVATION	SHEET	OF
							2,067± (NAD '83)	2	2
							METHOD OF DRILLING CME 85 hollow-stem auger drill rig		
							DRIVE WEIGHT	DROP	
							140 lbs. (auto trip hammer)	30"	
							SAMPLED BY	LOGGED BY	REVIEWED BY
							MAB	MAB	EDE
							DESCRIPTION/INTERPRETATION		
20						CL	<u>ALLUVIUM (continued):</u> Brown, damp, very stiff, lean CLAY; trace sand and gravel; slightly cemented.		
							Slightly porous; sampler refusal after 5".		
25									
							Sampler refusal after 3".		
							Total depth = 29.3 feet.		
30							Groundwater not encountered during drilling.		
							Backfilled on 02/22/06.		
35									
40									




BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-36

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED	BORING NO.				
							02/24/06	B-24				
							GROUND ELEVATION	2,060± (NAD '83)	SHEET	1	OF	3
							METHOD OF DRILLING			CME 85 hollow-stem auger drill rig		
							DRIVE WEIGHT	140 lbs. (auto trip hammer)	DROP	30"		
							SAMPLED BY	MAB	LOGGED BY	MAB	REVIEWED BY	EDE
							DESCRIPTION/INTERPRETATION					
0		4/6" 12/6" 30/6"	1.0	125.3		GM	<u>ALLUVIUM:</u> Brown, damp, loose to medium dense, silty GRAVEL with sand.					
5		8/6" 24/6" 32/6"	4.1	110.6								
10		50/5"	6.5	86.4		CL	Brown, damp, very stiff, lean CLAY; trace sand; slightly cemented; slightly gypsiferous. Sampler refusal after 5".					
15		13/6" 18/6" 42/6"	7.3	115.9								
20		9/6" 50/4"					Sampler refusal after 10".					




BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO.	DATE	FIGURE
301699005	05/06	A-37

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED	BORING NO.			
							02/24/06	B-24			
GROUND ELEVATION							2,060± (NAD '83)	SHEET	2	OF	3
METHOD OF DRILLING							CME 85 hollow-stem auger drill rig				
DRIVE WEIGHT							140 lbs. (auto trip hammer)	DROP	30"		
SAMPLED BY							MAB	LOGGED BY	MAB	REVIEWED BY	EDE
DESCRIPTION/INTERPRETATION											
20						CL	<u>ALLUVIUM (continued):</u> Brown, damp, very stiff, lean CLAY; trace sand; slightly cemented; slightly gypsiferous.				
		50/5"	9.7	79.3			Sampler refusal after 5".				
25											
		30/6" 50/2"	8.1	95.9			Sampler refusal after 8".				
30											
		50/1"					Light brown, dry, moderately hard, CALICHE; moderately cemented; composed primarily of fine-grained material. Sampler refusal after 1".				
35											
		50/1"					Sampler refusal after 1".				
40											



BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-38

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED	BORING NO.				
							02/24/06	B-24				
							GROUND ELEVATION	2,060± (NAD '83)	SHEET	3	OF	3
							METHOD OF DRILLING			CME 85 hollow-stem auger drill rig		
							DRIVE WEIGHT	140 lbs. (auto trip hammer)	DROP	30"		
							SAMPLED BY	MAB	LOGGED BY	MAB	REVIEWED BY	EDE
							DESCRIPTION/INTERPRETATION					
40							<u>ALLUVIUM (continued):</u> Light brown, dry, moderately hard, CALICHE; moderately cemented; composed primarily of fine-grained material.					
		50/1"					Sampler refusal after 1".					
45												
		50/<1"					Sampler refusal. Total depth = 49.0 feet. Groundwater not encountered during drilling. Backfilled on 02/24/06.					
50												
55												
60												



BORING LOG

VETERANS AFFAIRS MEDICAL CENTER
NORTH LAS VEGAS, NEVADA

PROJECT NO. 301699005	DATE 05/06	FIGURE A-39
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DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>02/24/06</u> BORING NO. <u>B-25</u>	
							GROUND ELEVATION <u>2,055± (NAD '83)</u> SHEET <u>1</u> OF <u>2</u>	
METHOD OF DRILLING <u>CME 85 hollow-stem auger drill rig</u>							DRIVE WEIGHT <u>140 lbs. (auto trip hammer)</u> DROP <u>30"</u>	
SAMPLED BY <u>MAB</u> LOGGED BY <u>MAB</u> REVIEWED BY <u>EDE</u>							DESCRIPTION/INTERPRETATION	
0		9/6" 26/6" 50/4"	1.8	120.6		GM	<u>ALLUVIUM:</u> Brown, damp, loose to medium dense, silty GRAVEL with sand. Very dense; sampler refusal after 16".	
5		36/6" 50/3"	5.0	108.9			Sampler refusal after 9".	
10		50/5"	4.8	96.2		CL	Brown, damp, very stiff, lean CLAY with gravel; trace sand; moderately to highly gypsiferous; slightly cemented. Sampler refusal after 5".	
15		50/5"	6.5	89.3			Sampler refusal after 5".	
20		50/3"					Sampler refusal after 3". Total depth = 19.3 feet.	

Ninyo & Moore

BORING LOG

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NORTH LAS VEGAS, NEVADA

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05/06

FIGURE

A-40

[illegible]

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED	BORING NO.
							02/27/06	B-26
							GROUND ELEVATION	SHEET
							2,055± (NAD '83)	1 OF 2
							METHOD OF DRILLING	
							CME 85 hollow-stem auger drill rig	
							DRIVE WEIGHT	DROP
							140 lbs. (auto trip hammer)	30"
							SAMPLED BY	LOGGED BY
							MAB	MAB
							REVIEWED BY	EDE
							DESCRIPTION/INTERPRETATION	
0		10/6" 50/5"	0.8	119.9		GM	<u>ALLUVIUM:</u> Brown, damp, loose to medium dense, silty GRAVEL with sand. Very dense; sampler refusal after 11".	
5		30/6" 50/3"	4.0	108.1			Sampler refusal after 9".	
10		35/6" 50/3"	6.8	98.1		CL	Sampler refusal after 9". Brown, damp, very stiff, lean CLAY with gravel; highly gypsiferous; slightly cemented.	
15		50/4"					Sampler refusal after 4".	
							Trace gravel.	
20		50/5"					Sampler refusal after 5". Light brown, dry, moderately hard, CALICHE; moderately cemented; composed primarily	




BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-42

DEPTH (feet)	SAMPLES		BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>02/27/06</u> BORING NO. <u>B-26</u> GROUND ELEVATION <u>2,055'± (NAD '83)</u> SHEET <u>2</u> OF <u>2</u> METHOD OF DRILLING <u>CME 85 hollow-stem auger drill rig</u> DRIVE WEIGHT <u>140 lbs. (auto trip hammer)</u> DROP <u>30"</u> SAMPLED BY <u>MAB</u> LOGGED BY <u>MAB</u> REVIEWED BY <u>EDE</u>		
	Bulk	Driven						DESCRIPTION/INTERPRETATION		
20								of fine-grained material. <u>ALLUVIUM (continued):</u> Light brown, dry, moderately hard CALICHE; moderately cemented; composed primarily of fine-grained material. Hard; strongly cemented.		
25			37/6" 50/3"	17.7	97.9			Moderately hard; moderately cemented; sampler refusal after 9".		
30			50/5"					Sampler refusal after 5". Total depth = 29.4 feet. Groundwater not encountered during drilling. Backfilled on 02/27/06.		
35										
40										




BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-43

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>02/24/06</u> BORING NO. <u>B-27</u> GROUND ELEVATION <u>2,058± (NAD '83)</u> SHEET <u>1</u> OF <u>2</u> METHOD OF DRILLING <u>CME 85 hollow-stem auger drill rig</u> DRIVE WEIGHT <u>140 lbs. (auto trip hammer)</u> DROP <u>30"</u> SAMPLED BY <u>MAB</u> LOGGED BY <u>MAB</u> REVIEWED BY <u>EDE</u> DESCRIPTION/INTERPRETATION		
							0		7/6" 27/6" 50/3"
5		17/6" 50/3"	3.4	110.0			Sampler refusal after 9".		
10		27/6" 50/5"	4.6	98.5		CL	Brown, damp, very stiff, lean CLAY; trace gravel and sand; moderately to highly gypsiferous; slightly cemented. Sampler refusal after 11".		
15		50/5"	12.2	76.6			Sampler refusal after 5".		
20									



BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
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DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED	BORING NO.				
							02/24/06	B-27				
							GROUND ELEVATION	2,058± (NAD '83)	SHEET	2	OF	2
							METHOD OF DRILLING			CME 85 hollow-stem auger drill rig		
							DRIVE WEIGHT	140 lbs. (auto trip hammer)	DROP	30"		
							SAMPLED BY	MAB	LOGGED BY	MAB	REVIEWED BY	EDE
DESCRIPTION/INTERPRETATION												
20	X	50/3"				CL	<u>ALLUVIUM (continued):</u> Brown, damp, very stiff, lean CLAY; trace gravel and sand; moderately to highly gypsiferous; slightly cemented. Sampler refusal after 3". Total depth = 20.3 feet. Groundwater not encountered during drilling. Backfilled on 02/28/06.					
25												
30												
35												
40												




BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO.	DATE	FIGURE
301699005	05/06	A-45



DEPTH (feet)	SAMPLES	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED	BORING NO.
							03/01/06	B-28
GROUND ELEVATION							2,045'± (NAD '83)	SHEET 1 OF 1
METHOD OF DRILLING							Mobile B60 hollow-stem auger drill rig	
DRIVE WEIGHT							140 lbs. (spooling cable)	DROP 30"
SAMPLED BY							SJG	LOGGED BY SJG
							REVIEWED BY	EDE
DESCRIPTION/INTERPRETATION								
0		27/6" 50/4"				GM	<u>ALLUVIUM:</u> Brown, damp, medium dense to very dense, silty GRAVEL with sand. Sampler refusal after 10".	
5		50/5"				CL	Brown, damp, very stiff, lean CLAY; few gravel; slightly cemented. Sampler refusal after 5".	
10		50/3"				CL	Trace gravel. Sampler refusal after 3".	
15		50/5"					Sampler refusal after 5". Total depth = 15.4 feet. Groundwater not encountered during drilling. Backfilled on 03/01/06.	
20								


BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-46

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>02/27/06</u> BORING NO. <u>B-29</u>		
							GROUND ELEVATION <u>2,058± (NAD '83)</u> SHEET <u>1</u> OF <u>2</u>		
METHOD OF DRILLING <u>CME 85 hollow-stem auger drill rig</u>							DRIVE WEIGHT <u>140 lbs. (auto trip hammer)</u> DROP <u>30"</u>		
SAMPLED BY <u>MAB</u> LOGGED BY <u>MAB</u> REVIEWED BY <u>EDE</u>							DESCRIPTION/INTERPRETATION		
0		5/6" 15/6" 40/6"	3.0	117.4		GM	<u>ALLUVIUM:</u> Brown, damp, loose to medium dense, silty GRAVEL with sand.		
5		50/5"					Very dense; sampler refusal after 5".		
10		25/6" 50/5"	6.3	104.2		CL	Brown, damp, very stiff, lean CLAY; trace gravel; highly gypsiferous; slightly cemented. Sampler refusal after 11".		
15		30/6" 42/6" 45/6"	16.3	109.0					
20		42/6" 45/6"	11.2	91.3		CH	Brown, damp, very stiff, fat CLAY; few fine and medium sand; moderately gypsiferous; slightly cemented.		
							Sampler refusal after 15".		






BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
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DEPTH (feet)	SAMPLES		BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>02/27/06</u> BORING NO. <u>B-29</u> GROUND ELEVATION <u>2,058± (NAD '83)</u> SHEET <u>2</u> OF <u>2</u> METHOD OF DRILLING <u>CME 85 hollow-stem auger drill rig</u> DRIVE WEIGHT <u>140 lbs. (auto trip hammer)</u> DROP <u>30"</u> SAMPLED BY <u>MAB</u> LOGGED BY <u>MAB</u> REVIEWED BY <u>EDE</u>		
	Bulk	Driven						DESCRIPTION/INTERPRETATION		
20			50/3"				CL	<u>ALLUVIUM (continued):</u> Brown, damp, very stiff, fat CLAY; few fine and medium sand; moderately gypsiferous; slightly cemented.		
25			20/6" 37/6" 50/5"	12.7	96.3			Sampler refusal after 17".		
								Light brown, dry, moderately hard, CALICHE; moderately cemented; composed primarily of fine-grained material.		
30			50/5"					Sampler refusal after 5". Total depth = 29.4 feet. Groundwater not encountered during drilling. Backfilled on 02/27/06.		
35										
40										




BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-48

DEPTH (feet)	SAMPLES		BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>02/27/06</u> BORING NO. <u>B-30</u> GROUND ELEVATION <u>2,055± (NAD '83)</u> SHEET <u>1</u> OF <u>3</u> METHOD OF DRILLING <u>CME 85 hollow-stem auger drill rig</u> DRIVE WEIGHT <u>140 lbs. (auto trip hammer)</u> DROP <u>30"</u> SAMPLED BY <u>MAB</u> LOGGED BY <u>MAB</u> REVIEWED BY <u>EDE</u> DESCRIPTION/INTERPRETATION		
	Bulk	Driven								
0			9/6" 45/6" 50/2"	2.2	121.1		GM	<u>ALLUVIUM:</u> Brown, damp, loose to medium dense, silty GRAVEL with sand. Sampler refusal after 14"; very dense. Sampler refusal after 16".		
5			7/6" 42/6" 50/4"	7.9	95.2					
10			50/5"	5.7	89.3		CL	Brown, damp, very stiff, lean CLAY with gravel; highly gypsiferous; slightly cemented. Sampler refusal after 5". Sampler refusal after 4". Sampler refusal after 1".		
15			50/4"							
20			50/1"							



BORING LOG		
VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699005	DATE 05/06	FIGURE A-49

DEPTH (feet)	SAMPLES		BLOWS	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED	BORING NO.
	Bulk	Driven							
								02/27/06	B-30
								GROUND ELEVATION 2,055± (NAD '83)	SHEET 2 OF 3
								METHOD OF DRILLING CME 85 hollow-stem auger drill rig	
								DRIVE WEIGHT 140 lbs. (auto trip hammer)	DROP 30"
								SAMPLED BY MAB	LOGGED BY MAB
								REVIEWED BY EDE	
								DESCRIPTION/INTERPRETATION	
20							CL	<u>ALLUVIUM (continued):</u> Brown, damp, very stiff, lean CLAY; slightly cemented.	
								Sampler refusal after 4".	
25									
								Sampler refusal after 11".	
30									
								Sampler refusal.	
35									
								Sampler refusal after 11"; greenish brown.	
40									



BORING LOG

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PROJECT NO. 301699005	DATE 05/06	FIGURE A-50
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APPENDIX B

Laboratory Testing Procedures and Results

Classification

Soils were visually and texturally classified in accordance with the Unified Soil Classification System (USCS) in general accordance with ASTM D 2488-00. Soil classifications are indicated on the exploratory boring logs in Appendix A.

In-Place Moisture and Dry Density Tests

The moisture content and dry density of relatively selected undisturbed samples obtained from the exploratory borings were evaluated in general accordance with ASTM D 2937-00. The test results are presented on the logs of the exploratory borings in Appendix A.

Gradation Analysis Tests

Gradation analysis tests were performed on selected soil samples in general accordance with ASTM D 422-63(02). The test results were utilized in evaluating the soil classification in accordance with the USCS. The grain-size distribution curves are shown on Figure B-1 through Figure B-13.

Atterberg Limits Tests

Tests were performed on selected representative soil samples to evaluate the liquid limit, plastic limit, and plasticity index in general accordance with ASTM D 4318-00. These test results were also utilized to evaluate the soil classification in accordance with the USCS. The test results and classifications are shown on Figure B-14 and Figure B-15.

Consolidation Tests

Consolidation tests were performed on selected relatively undisturbed soil samples in general accordance with ASTM D 2435-03. The samples were inundated during testing to represent adverse field conditions. The percent of consolidation for each load cycle was recorded as a ratio of the amount of vertical compression to the original height of the sample. The results of the tests are summarized graphically on Figure B-16 through Figure B-19 and the expansion /collapse potential results are summarized on Figure B-20.

Swell Potential Tests

Swell potential tests were performed on a selected relatively undisturbed soil samples in general accordance with Section 1802.3.3 of the Southern Nevada Amendments to the 2000 International Building Code (IBC). The samples were inundated during testing to represent adverse field conditions. The percent of swell at 60 (psf) pounds per square foot overburden pressure was

recorded as a ratio of the amount of vertical compression to the original height of the samples. The results of the tests are summarized on Figure B-20.

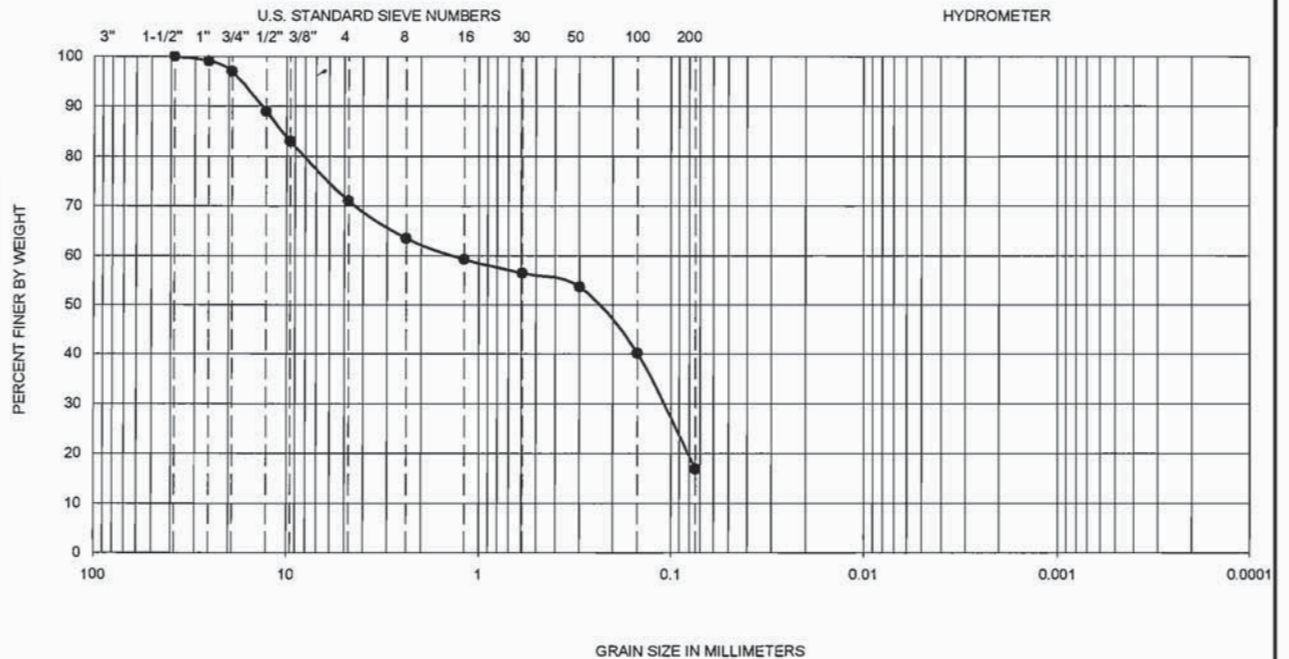
Miller Box Resistivity Tests

Resistivity tests were performed on selected samples to measure the resistivity of the soil as an indication of the relative ability of the soil to carry electrical current in general accordance with ASTM G 57-95a. A voltage was impressed between two outer electrodes and the resistance between inner electrodes was measured using a Nilsson soil resistance meter, Model 400. The samples were tested at increasing moisture contents until saturated. The results of the tests are summarized on Figure B-21.

R-Value Tests

The resistance R-value of selected samples of the near-surface soils was evaluated in general accordance with the ASTM D 2844-94. The samples were prepared and tested for exudation pressure and R-value. The R-values by exudation pressure are shown on Figure B-22.

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

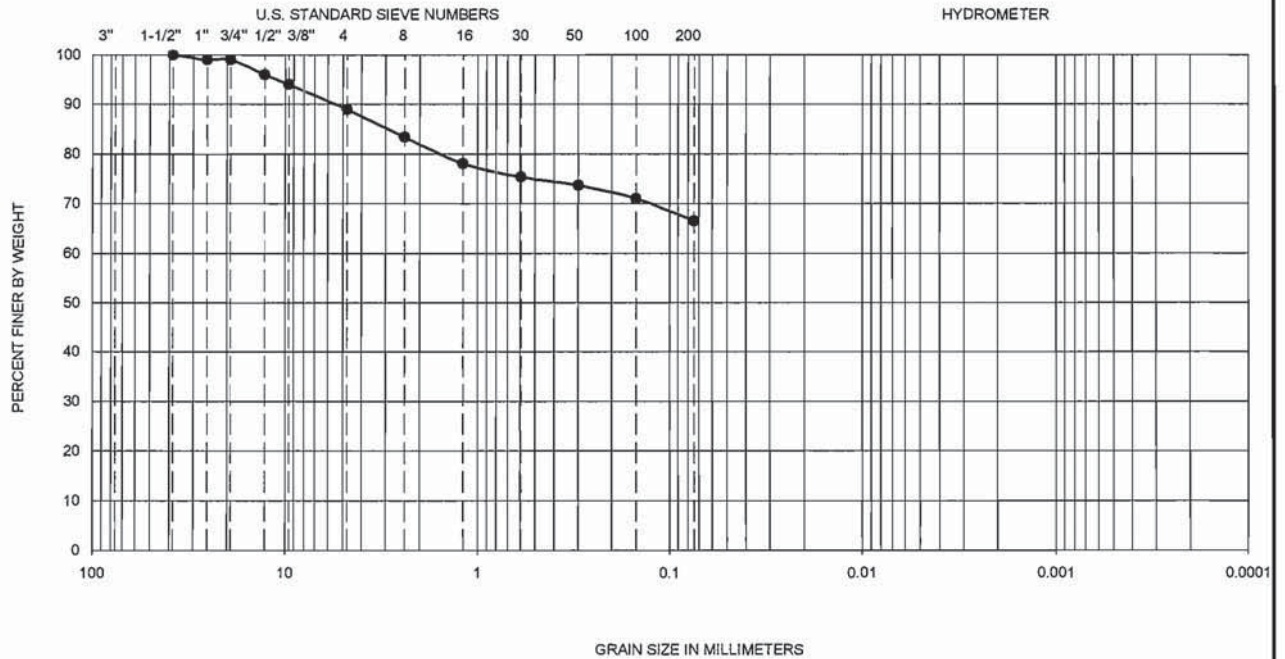


Symbol	Hole No.	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	Passing No. 200 (%)	U.S.C.S
●	B-1	1.0-4.0	--	--	non-plastic	--	--	--	--	--	17	SM

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-63 (02)

<i>Ninyo & Moore</i>		GRADATION TEST RESULTS	FIGURE B-1
PROJECT NO.	DATE	VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA	
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GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

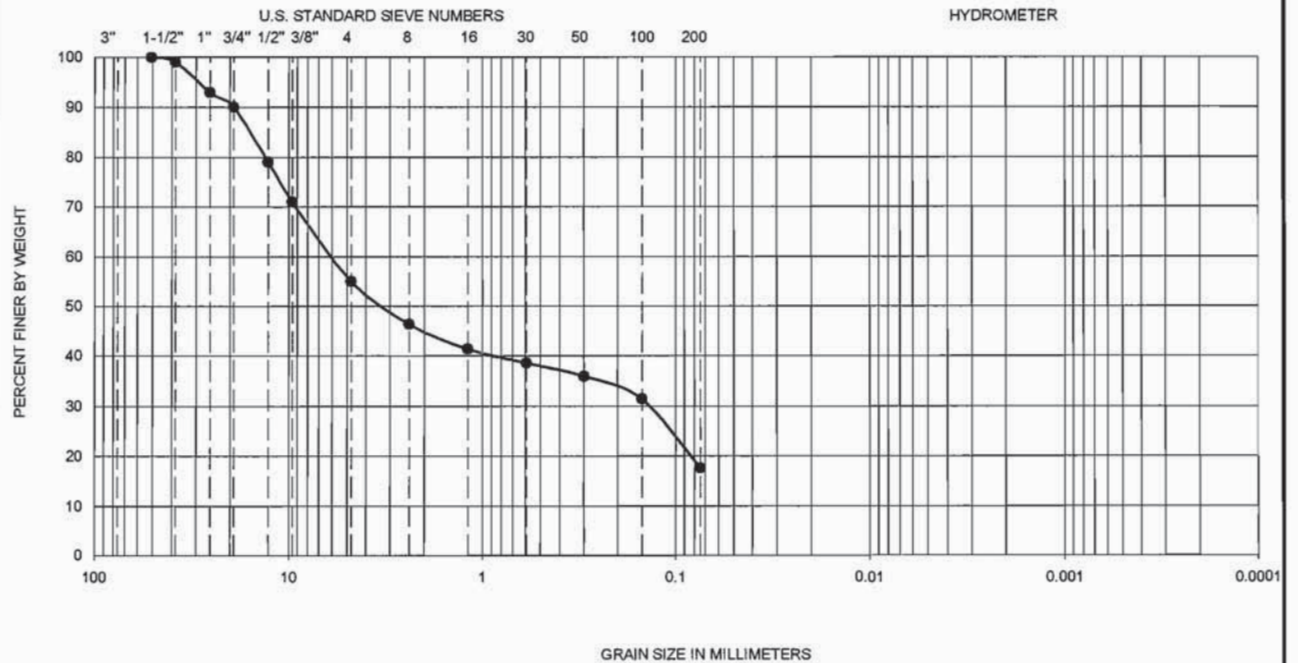


Symbol	Hole No.	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	Passing No. 200 (%)	U.S.C.S
●	B-2	7.0-9.0	46	21	25	--	--	--	--	--	67	CL

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-63 (02)

Ninyo & Moore		GRADATION TEST RESULTS	FIGURE B-2
PROJECT NO.	DATE	VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA	
301699005	05/06		

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

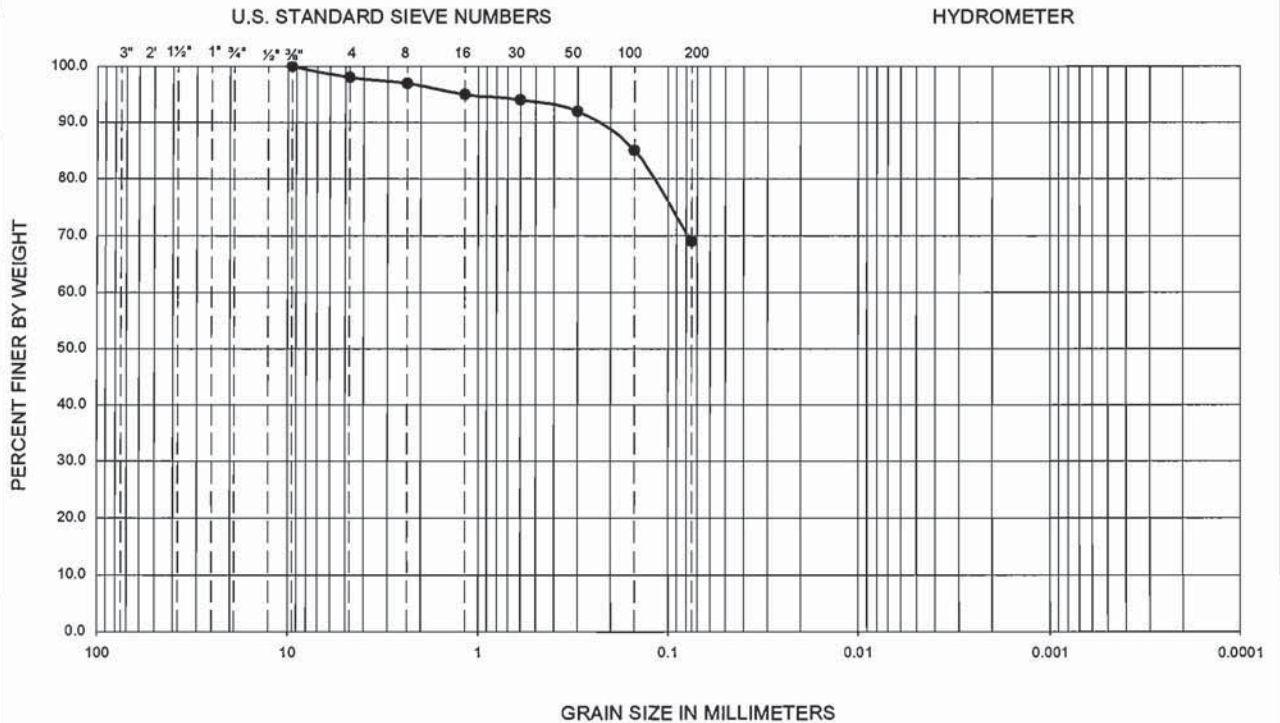


Symbol	Hole No.	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	Passing No. 200 (%)	U.S.C.S
●	B-5	1.0-4.0	25	21	4	--	--	--	--	--	18	GC-GM

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-63 (02)

Ninyo & Moore		GRADATION TEST RESULTS	FIGURE B-3
PROJECT NO.	DATE	VETERANS AFFAIRS MEDICAL CENTER	
301699005	05/06	NORTH LAS VEGAS, NEVADA	

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY

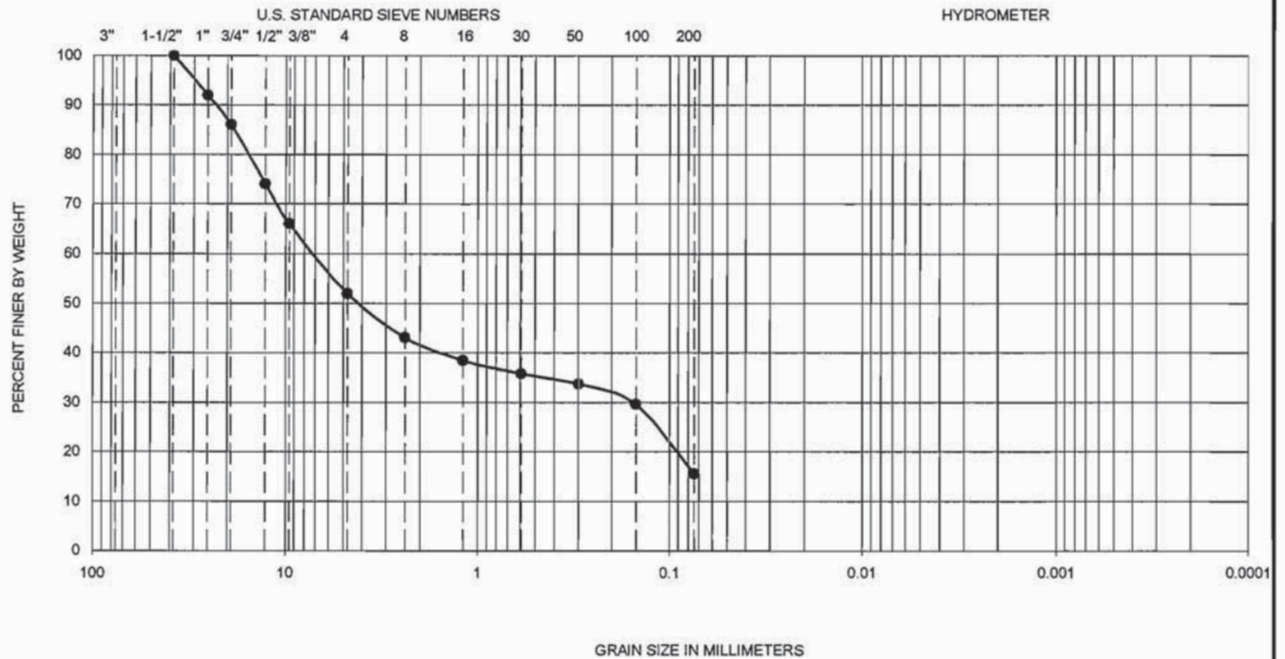


Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	Passing No. 200 (%)	U.S.C.S
●	B-8	5.0-6.5	48	26	22	--	--	--	--	--	69	CL

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-63 (02)

<i>Ninyo & Moore</i>		GRADATION TEST RESULTS	FIGURE B-4
PROJECT NO.	DATE	VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA	
301699005	05/06		

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

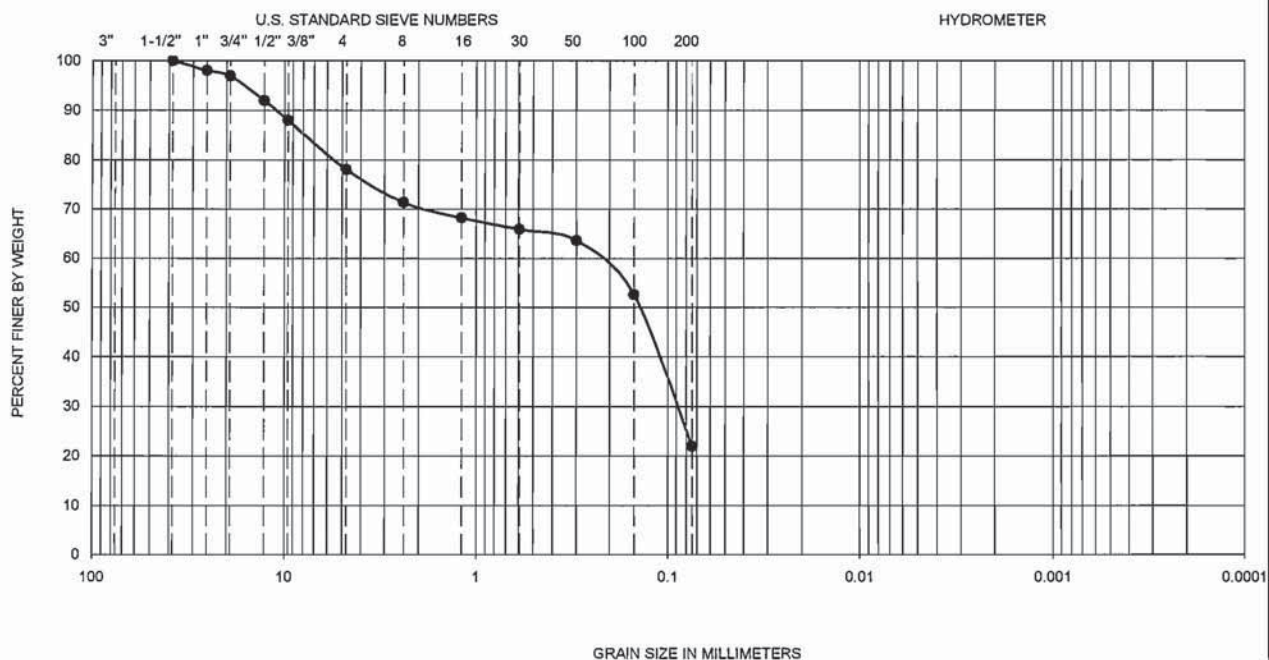


Symbol	Hole No.	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	Passing No. 200 (%)	U.S.C.S
●	B-10	2.0-3.0	29	23	6	--	--	--	--	--	16	GM

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-63 (02)

Ninyo & Moore		GRADATION TEST RESULTS	FIGURE B-5
PROJECT NO.	DATE	VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA	
301699005	05/06		

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

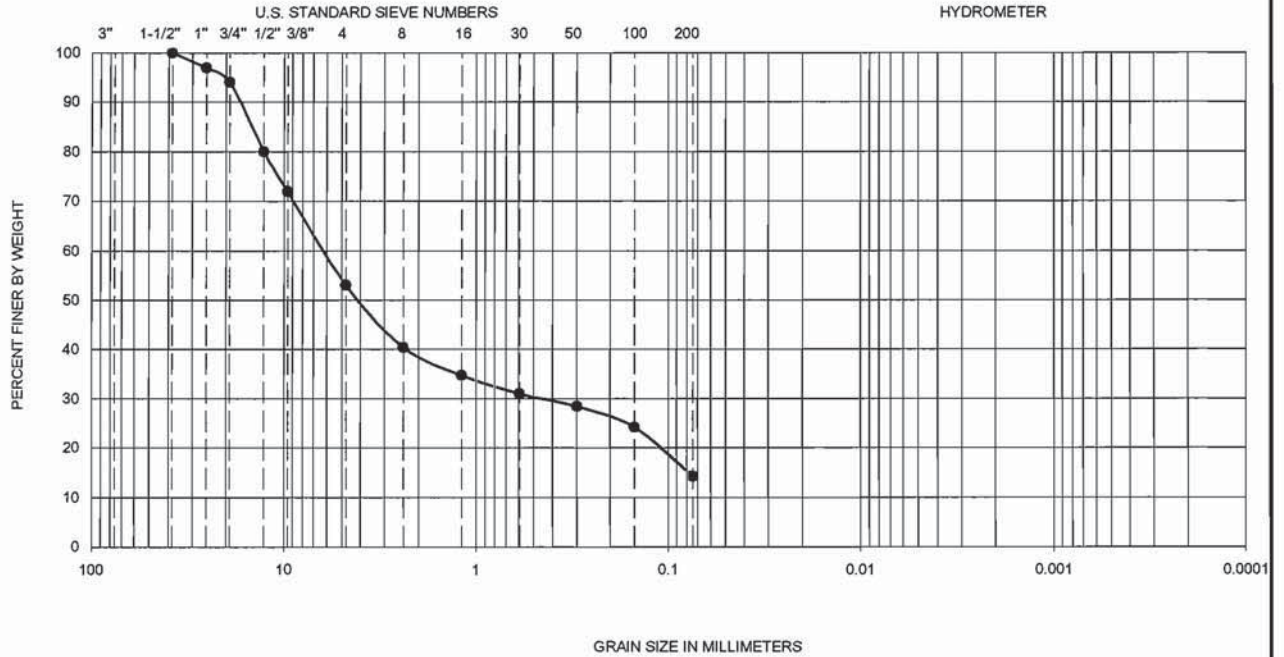


Symbol	Hole No.	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	Passing No. 200 (%)	U.S.C.S
●	B-12	1.0-4.0	--	--	non-plastic	--	--	--	--	--	22	SM

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-63 (02)

Ninyo & Moore		GRADATION TEST RESULTS	FIGURE B-6
PROJECT NO.	DATE	VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA	
301699005	05/06		

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

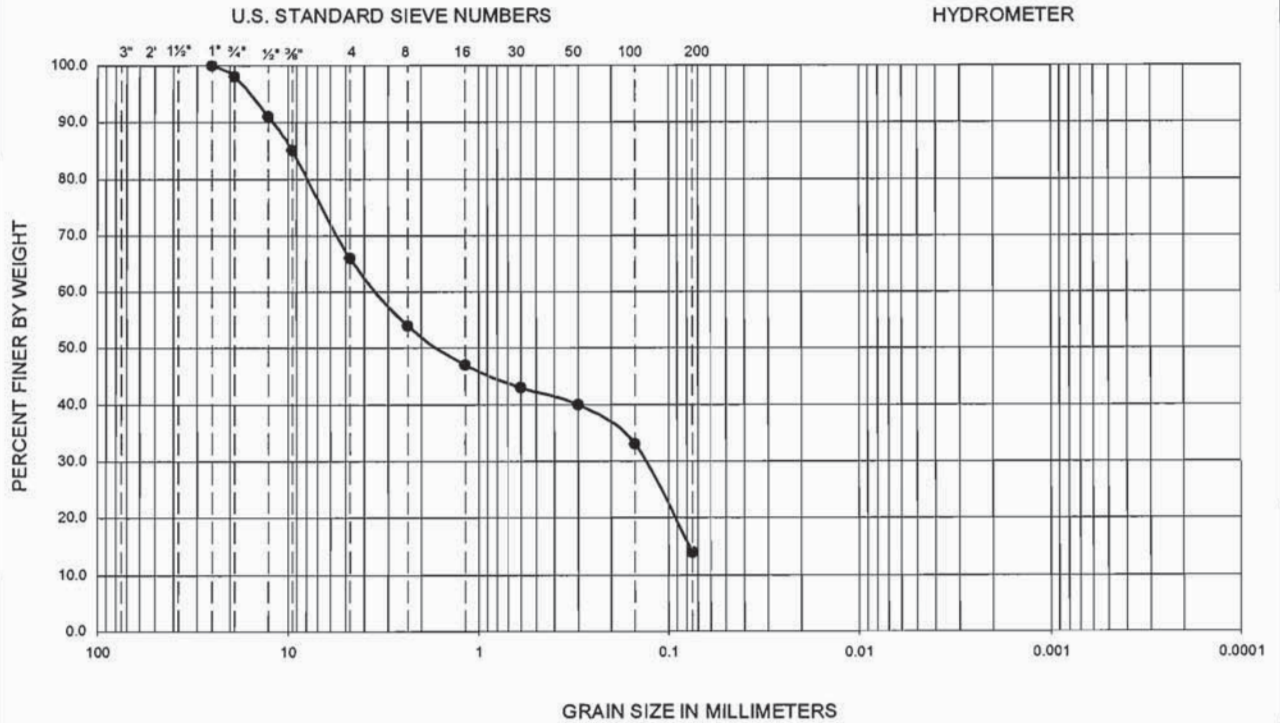


Symbol	Hole No.	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	Passing No. 200 (%)	U.S.C.S
●	B-13	3.0-4.0	35	24	11	--	--	--	--	--	14	GM

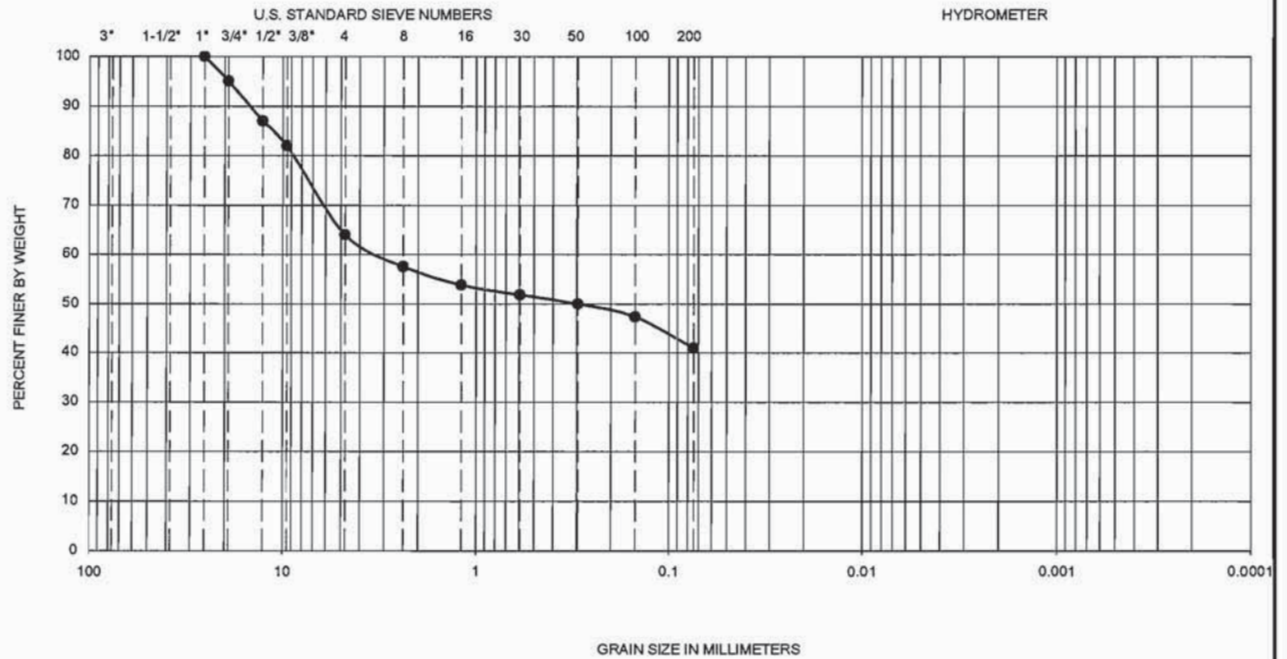
PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-63 (02)

Ninyo & Moore		GRADATION TEST RESULTS	FIGURE B-7
PROJECT NO.	DATE	VETERANS AFFAIRS MEDICAL CENTER	
301699005	05/06	NORTH LAS VEGAS, NEVADA	

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY



GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

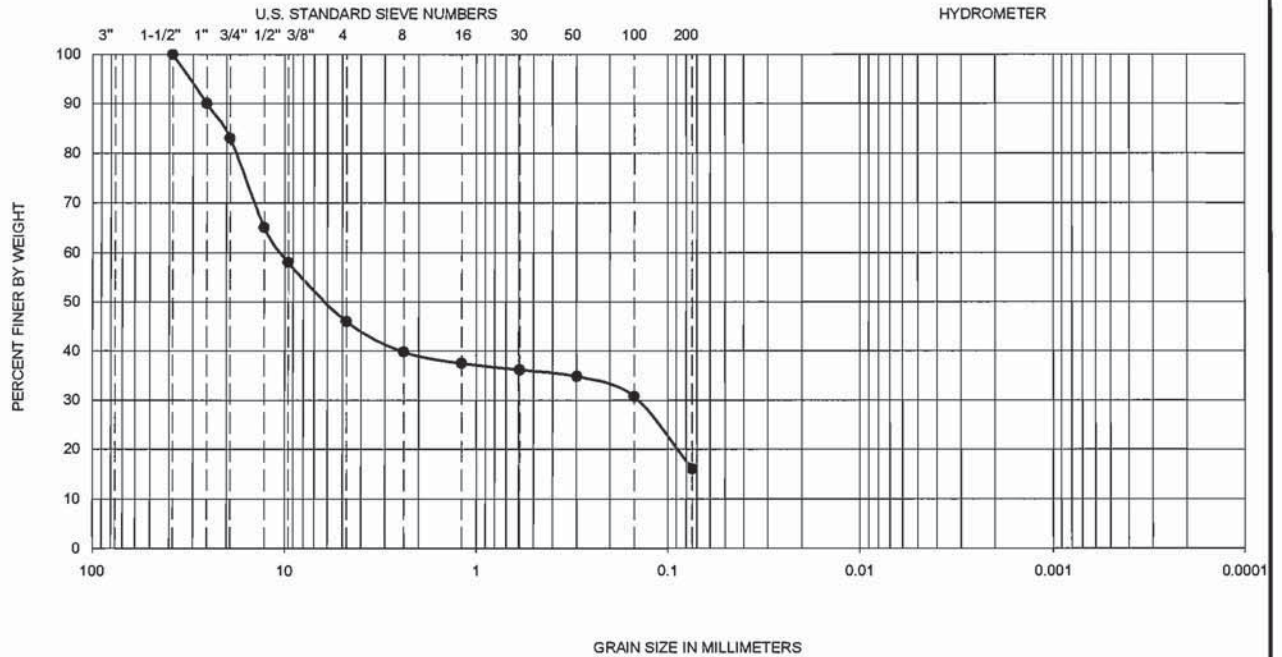


Symbol	Hole No.	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	Passing No. 200 (%)	U.S.C.S
●	B-16	16.0-17.0	51	20	31	--	--	--	--	--	41	GC

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-63 (02)

Ninyo & Moore		GRADATION TEST RESULTS	FIGURE B-9
PROJECT NO.	DATE	VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA	
301699005	05/06		

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

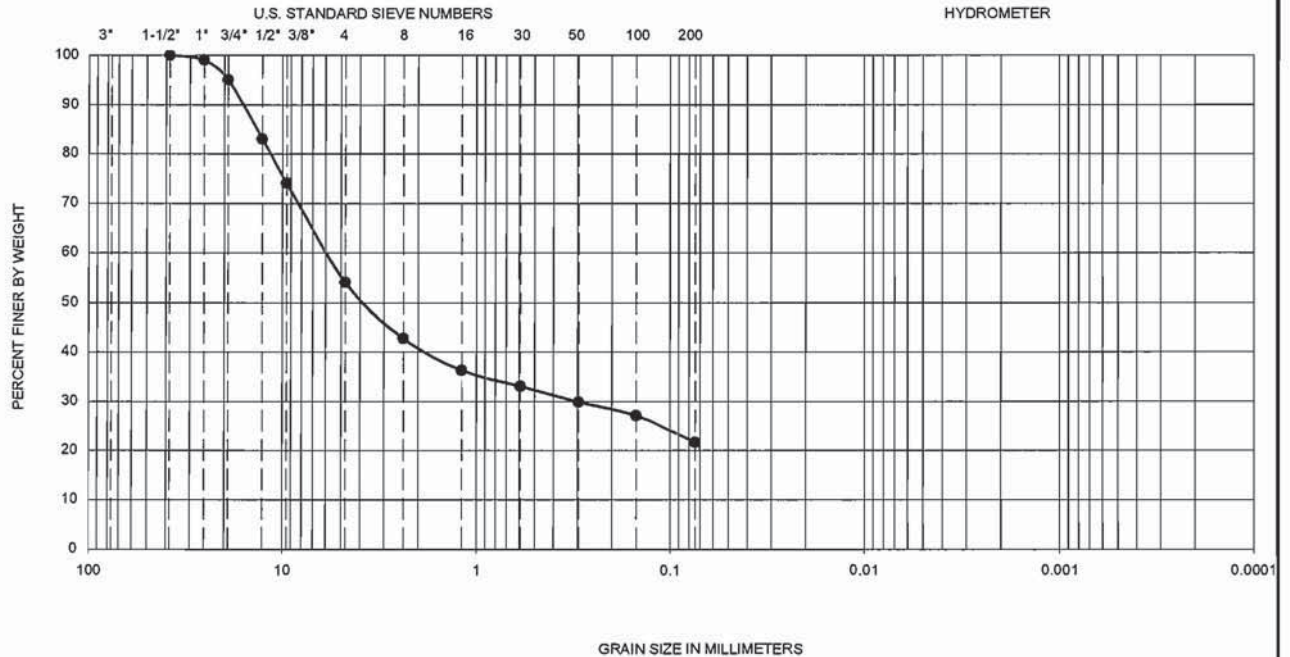


Symbol	Hole No.	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	Passing No. 200 (%)	U.S.C.S
●	B-19	0.0-1.0	--	--	non-plastic	--	--	--	--	--	16	GM

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-63 (02)

Ninyo & Moore		GRADATION TEST RESULTS		FIGURE
PROJECT NO.	DATE	VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		B-10
301699005	05/06			

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

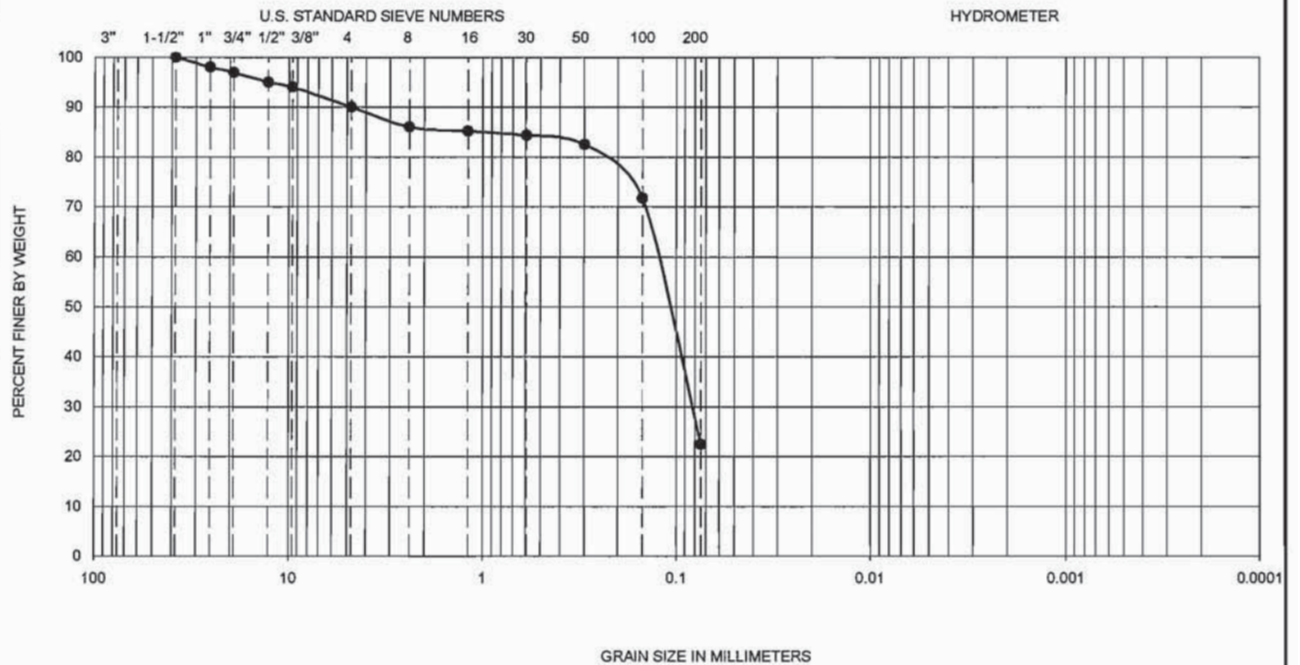


Symbol	Hole No.	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	Passing No. 200 (%)	U.S.C.S
●	B-21	13.0-14.0	50	21	29	--	--	--	--	--	22	GC

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-63 (02)

Ninyo & Moore		GRADATION TEST RESULTS			FIGURE
PROJECT NO.	DATE	VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA			B-11
301699005	05/06				

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	Silt	Clay

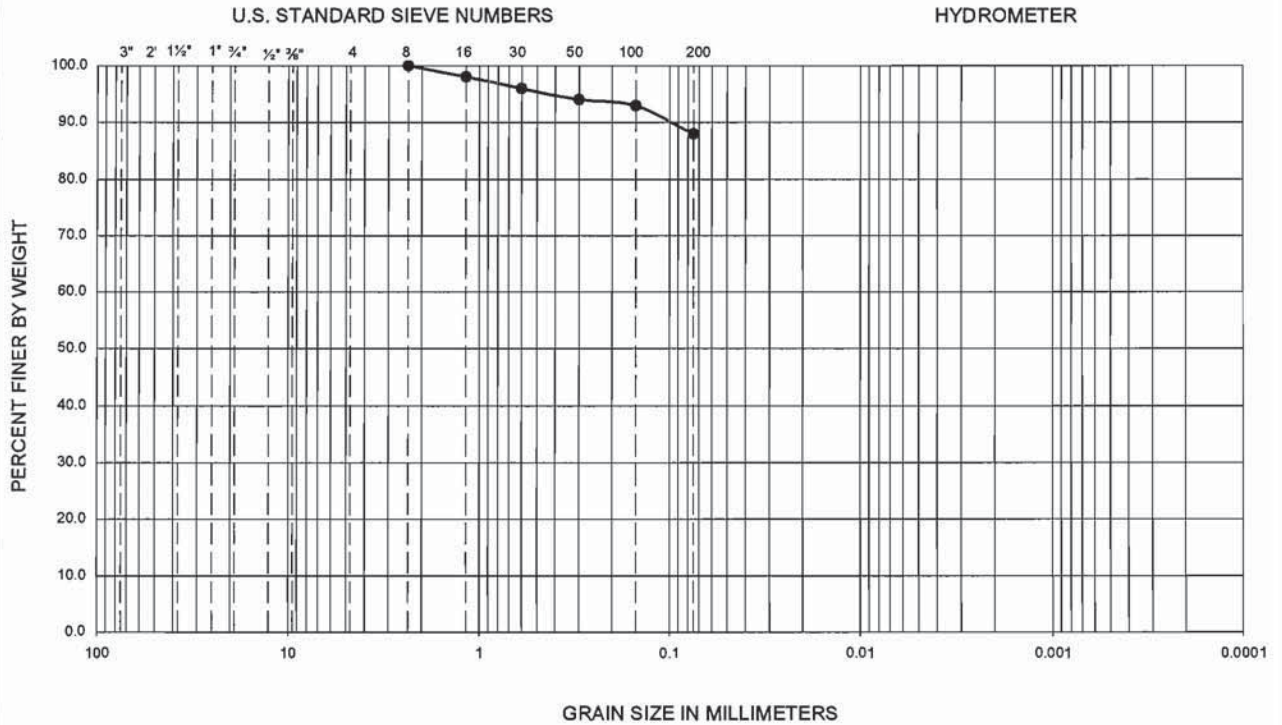


Symbol	Hole No.	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	Passing No. 200 (%)	U.S.C.S
●	B-22	0.0-1.0	--	--	non-plastic	--	--	--	--	--	22	SM

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-63 (02)

Ninyo & Moore		GRADATION TEST RESULTS	FIGURE B-12
PROJECT NO.	DATE	VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA	
301699005	05/06		

GRAVEL		SAND			FINES	
Coarse	Fine	Coarse	Medium	Fine	SILT	CLAY

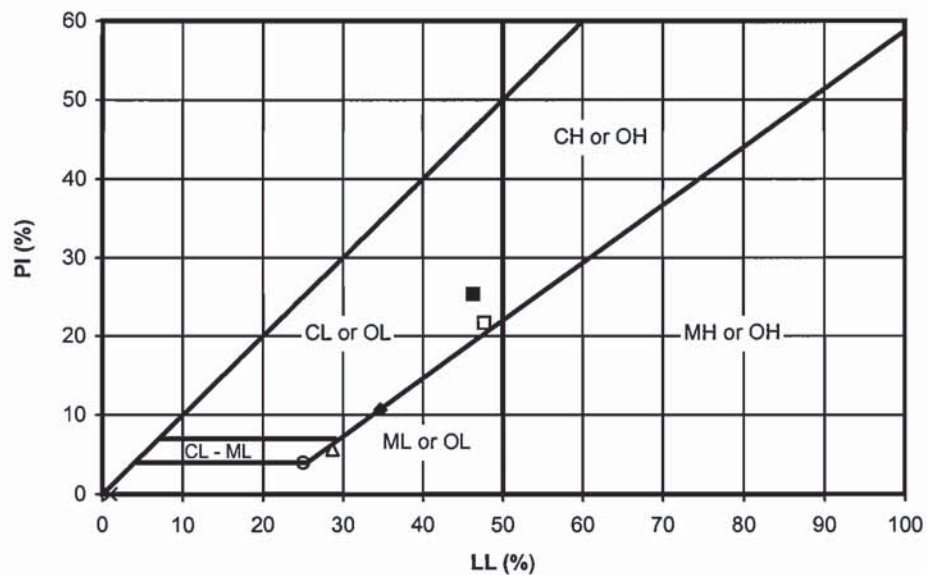


Symbol	Sample Location	Depth (ft)	Liquid Limit	Plastic Limit	Plasticity Index	D ₁₀	D ₃₀	D ₆₀	C _u	C _c	Passing No. 200 (%)	U.S.C.S
●	B-29	19.0-20.3	65	23	42	--	--	--	--	--	88	CH

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 422-63 (02)

Ninyo & Moore		GRADATION TEST RESULTS	FIGURE B-13
PROJECT NO.	DATE	VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA	
301699005	05/06		

SYMBOL	LOCATION	DEPTH (FT)	LIQUID LIMIT, LL (%)	PLASTIC LIMIT, PL (%)	PLASTICITY INDEX, PI (%)	USCS CLASSIFICATION (Fraction Finer Than No. 40 Sieve)	USCS (Entire Sample)
■	B-1	1.0-4.0	--	--	NP	ML	SM
○	B-2	7.0-9.0	46	21	25	CL	CL
□	B-5	1.0-4.0	25	21	4	CL-ML	GC-GM
△	B-8	5.0-6.5	48	26	22	CL	CL
△	B-10	2.0-3.0	29	23	6	ML	GM
◆	B-12	1.0-4.0	--	--	NP	ML	SM
◆	B-13	3.0-4.0	35	24	11	ML	GM

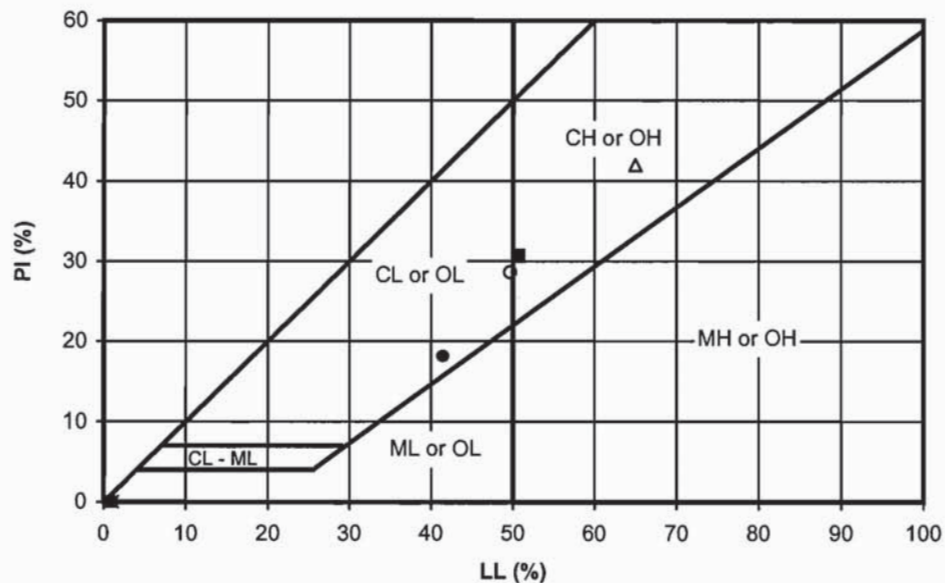


PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4318-00

Ninyo & Moore		ATTERBERG LIMITS TEST RESULTS		FIGURE
PROJECT	DATE	MEDICAL CENTER VETERANS AFFAIRS NORTH LAS VEGAS, NEVADA		B-14
301699005	05/06			

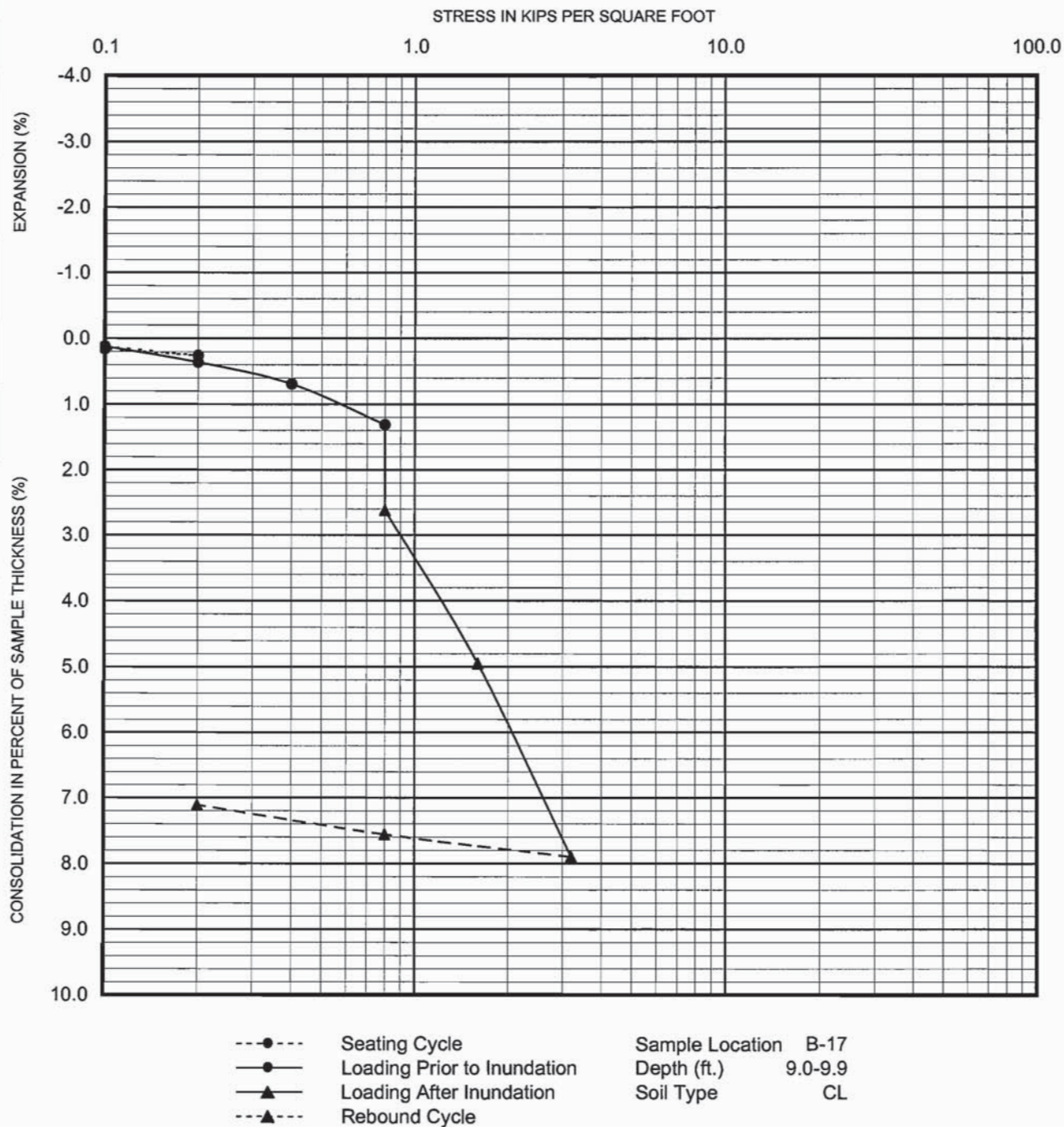
SYMBOL	LOCATION	DEPTH (FT)	LIQUID LIMIT, LL (%)	PLASTIC LIMIT, PL (%)	PLASTICITY INDEX, PI (%)	USCS CLASSIFICATION (Fraction Finer Than No. 40 Sieve)	USCS (Entire Sample)
■	B-15	0.0-1.4	--	--	NP	ML	SM
	B-16	19.0-19.9	51	20	31	CH	GC
	B-19	0.0-1.0	--	--	NP	ML	GM
○	B-21	13.0-14.0	50	21	29	CL	GC
	B-22	0.0-1.0	--	--	NP	ML	SM
●	B-24	4.0-5.5	41	23	18	CL	GM
Δ	B-29	19.0-20.3	65	23	42	CH	CH

NP - Indicates Non-Plastic



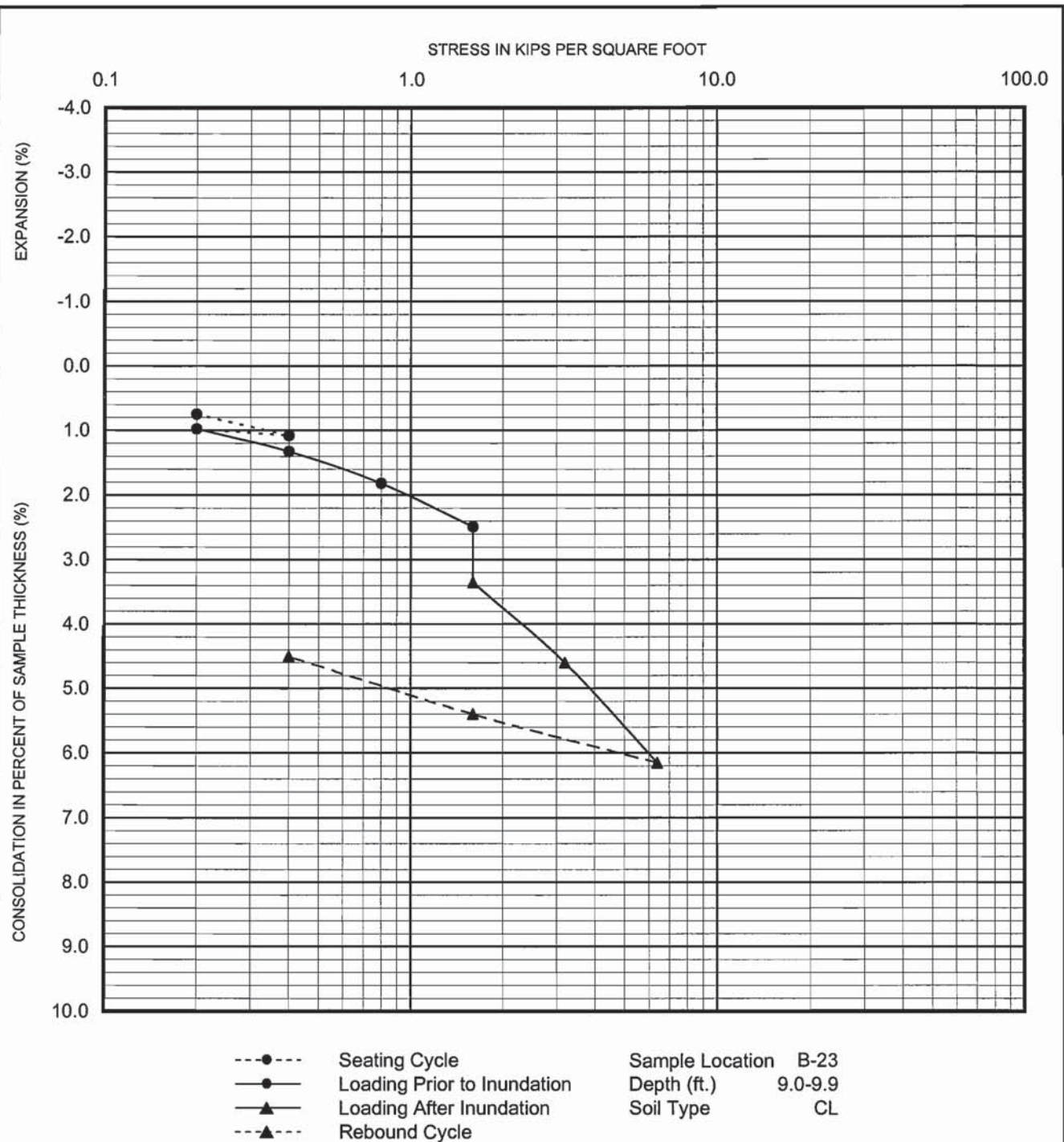
PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4318-00

Ninyo & Moore		ATTERBERG LIMITS TEST RESULTS	FIGURE B-15
PROJECT	DATE	VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA	
301699005	05/06		



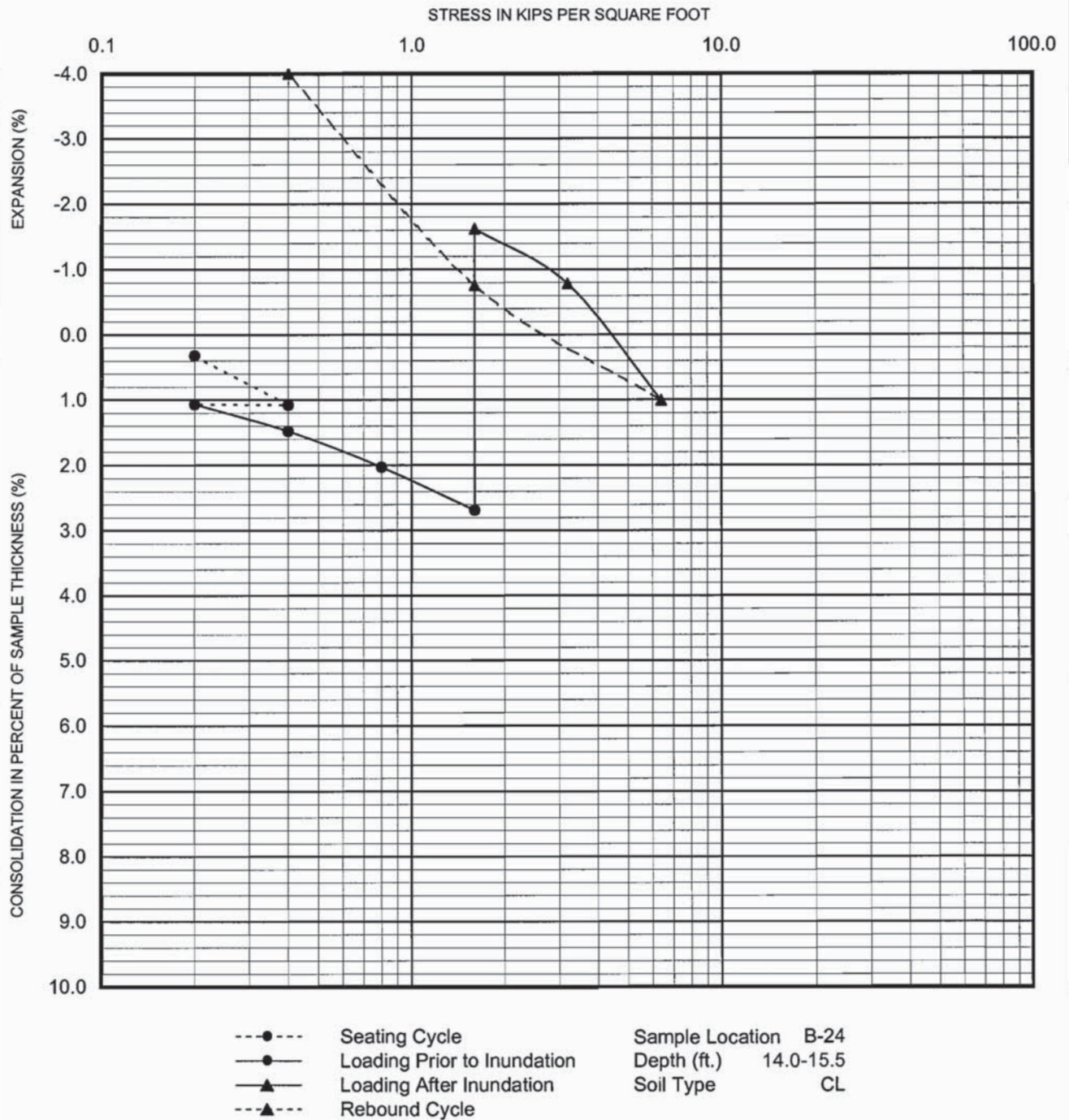
PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 2435-03

Ninyo & Moore		CONSOLIDATION TEST RESULTS	FIGURE B-16
PROJECT NO.	DATE	VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA	
301699005	05/06		



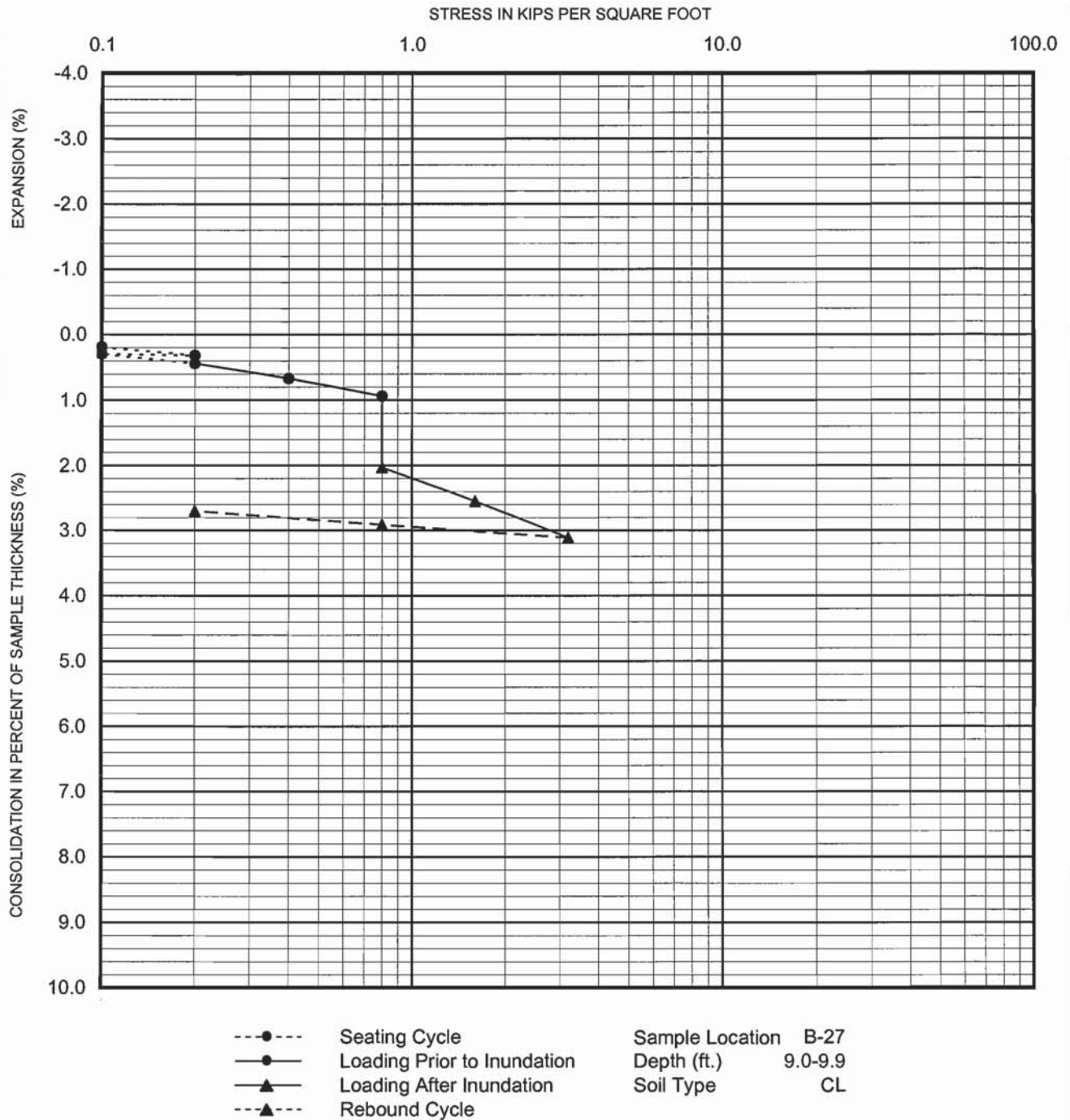
PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 2435-03

Ninyo & Moore		CONSOLIDATION TEST RESULTS	FIGURE B-17
PROJECT NO.	DATE	VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA	
301699005	05/06		



PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 2435-03

Ninyo & Moore		CONSOLIDATION TEST RESULTS	FIGURE
PROJECT NO.	DATE	VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA	B-18
301699005	05/06		



PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 2435-03

Ninyo & Moore		CONSOLIDATION TEST RESULTS	FIGURE
PROJECT NO.	DATE	VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA	B-19
301699005	05/06		

SAMPLE LOCATION	DEPTH (FT)	IN-PLACE MOISTURE CONTENT (%)	IN-PLACE DRY DENSITY (PCF)	FINAL MOISTURE CONTENT (%)	SURCHARGE (PSF)	EXPANSION POTENTIAL (%)	COLLAPSE POTENTIAL (%)
B-17	9.0-9.9	6.7	88.6	26.0	800	--	1.3
B-23	9.0-9.9	6.7	92.4	28.7	1600	--	0.9
B-27	9.0-9.9	5.0	93.3	24.9	800	--	1.1

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546-03

<i>Ninyo & Moore</i>		EXPANSION/COLLAPSE POTENTIAL TEST RESULTS	FIGURE
PROJECT NO.	DATE	VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA	B-20
301699005	05/06		

SAMPLE LOCATION	DEPTH (FT)	IN-PLACE MOISTURE CONTENT (%)	IN-PLACE DRY DENSITY (PCF)	FINAL MOISTURE CONTENT (%)	SURCHARGE (PSF)	SWELL POTENTIAL* (%)
B-19	14.0-14.4	7.9	75.9	38.0	60	-1.2
B-22	19.0-19.8	9.4	85.2	36.9	60	-0.4
B-25	9.0-9.4	4.4	91.7	25.1	60	-1.6
B-27	9.0-9.9	4.9	96.1	25.9	60	-0.2

* Minus number indicates collapse.

Ninyo & Moore		SWELL POTENTIAL TEST RESULTS	Figure
PROJECT NO.	DATE	VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA	B-21
301699005	05/06		

SAMPLE LOCATION	DEPTH (FT)	SOIL DESCRIPTION	RESISTIVITY (OHM-CM)	
			IN-SITU MOISTURE CONTENT	SATURATED MOISTURE CONTENT
B-15	16.0-17.0	CL	28000	550
B-17	17.0-18.0	CL	9300	760
B-18	13.0-14.0	CL	19000	340
B-19	16.0-17.0	CL	12000	310
B-20	3.0-4.0	GM	17000	740
B-24	7.0-8.0	GM	21000	650
B-25	2.0-3.0	GM	86000	9800
B-27	11.0-12.5	CL	2000	600
B-29	17.0-18.0	CL	32000	840

<i>Ninyo & Moore</i>		MILLER BOX RESISTIVITY TEST RESULTS	FIGURE B-22
PROJECT NO.	DATE		
301699005	05/06	VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA	

SAMPLE LOCATION	SAMPLE DEPTH (FT)	SOIL TYPE	R-VALUE
B-1	1.0-4.0	SM	70
B-5	1.0-4.0	GC-GM	72
B-7	1.0-4.0	GM	79

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 2844-00

<i>Ninyo & Moore</i>		R-VALUE TEST RESULTS	FIGURE B-23
PROJECT	DATE	VETERANS AFFAIRS MEDICAL CENTER	
301699005	05/06	NORTH LAS VEGAS, NEVADA	

APPENDIX C

Chemical and Solubility Test Results

The results of chemical and solubility tests performed are provided in this appendix.



LABORATORY REPORT

DATE: March 2, 2006

REPORT NUMBER: 06-0678

CLIENT: Ninyo & Moore
6700 Paradise Road, Suite E
Las Vegas, NV 89119

PAGE: 1 of 4

CLIENT PROJECT: 301699005

CLIENT PO #:

ANALYST: RA/JN/SW

Sampled By: Client

Date Sampled: --

Time Sampled: --

Date Received: 03/01/06

Time Received: 1643

Sample ID: B-15 @ 16.0-17.0'

Analysis	Result	Unit	Method
Sodium	0.00	%	ASTM D2791
Sulfate	0.02	%	SM 4500 E
Sodium Sulfate	0.00	%	Calculation
Total Salts (Solubility)	0.67	%	EPA 160.1

Sample ID: B-16 @ 12.0-13.0'

Analysis	Result	Unit	Method
Sodium	0.00	%	ASTM D2791
Sulfate	0.09	%	SM 4500 E
Sodium Sulfate	0.00	%	Calculation
Total Salts (Solubility)	0.58	%	EPA 160.1

NOTES: The results for each constituent denote the percentage (%) for that particular element which is soluble in a 1:5 (soil to water) extraction ratio and corrected for dilution. To calculate from a % to a concentration, multiply the % by 10,000 to obtain ppm. This conversion is only a rough number due to atomic weights.

REVIEWED BY:

A handwritten signature in black ink, appearing to be "R. Winter", written over a horizontal line.

Ronald W. Winter
Laboratory Director



LABORATORY REPORT

DATE: March 10, 2006

REPORT NUMBER: 06-0779

CLIENT: Ninyo & Moore
6700 Paradise Road, Suite E
Las Vegas, NV 89119

PAGE: 1 of 1

CLIENT PROJECT: 301699005

CLIENT PO #:

ANALYST: RA/JN/SW

Sampled By: Client

Date Sampled: --

Time Sampled: --

Date Received: 03/09/06

Time Received: 1633

Sample ID: B-18 @ 15.0-15.3'


Analysis	Result	Unit	Method
Sodium	0.05	%	ASTM D2791
Sulfate	0.17	%	SM 4500 E
Sodium Sulfate	0.14	%	Calculation
Total Salts (Solubility)	0.67	%	EPA 160.1

Sample ID: B-27 @ 11.0-12.5

Analysis	Result	Unit	Method
Sodium	0.02	%	ASTM D2791
Sulfate	0.23	%	SM 4500 E
Sodium Sulfate	0.07	%	Calculation
Total Salts (Solubility)	1.26	%	EPA 160.1

NOTES: The results for each constituent denote the percentage (%) for that particular element which is soluble in a 1:5 (soil to water) extraction ratio and corrected for dilution. To calculate from a % to a concentration, multiply the % by 10,000 to obtain ppm. This conversion is only a rough number due to atomic weights.

REVIEWED BY:


Ronald W. Winter
Laboratory Director

5070 South Arville Street, Suite 6 Las Vegas, NV 89118
Tel: 702-873-4478 Fax: 702-873-7967 www.ssalabs.com

Silver State Analytical Laboratories
Report Number: 06-0678
March 2, 2006

Sample ID: B-22 @ 14.0-15.4'

Analysis	Result	Unit	Method
Sodium	0.02	%	ASTM D2791
Sulfate	0.13	%	SM 4500 E
Sodium Sulfate	0.07	%	Calculation
Total Salts (Solubility)	0.69	%	EPA 160.1

Sample ID: B-24 @ 7.0-8.0'

Analysis	Result	Unit	Method
Sodium	0.02	%	ASTM D2791
Sulfate	0.03	%	SM 4500 E
Sodium Sulfate	0.05	%	Calculation
Total Salts (Solubility)	0.35	%	EPA 160.1

Sample ID: B-17 @ 17.0-18.0'

Analysis	Result	Unit	Method
Sodium	0.03	%	ASTM D2791
Sulfate	0.21	%	SM 4500 E
Sodium Sulfate	0.10	%	Calculation
Total Salts (Solubility)	1.14	%	EPA 160.1

Sample ID: B-25 @ 2.0-3.0'

Analysis	Result	Unit	Method
Sodium	0.02	%	ASTM D2791
Sulfate	0.02	%	SM 4500 E
Sodium Sulfate	0.03	%	Calculation
Total Salts (Solubility)	0.15	%	EPA 160.1

Silver State Analytical Laboratories
Report Number: 06-0678
March 2, 2006

Sample ID: B-23 @ 7.0-8.0'

Analysis	Result	Unit	Method
Sodium	0.06	%	ASTM D2791
Sulfate	0.01	%	SM 4500 E
Sodium Sulfate	0.01	%	Calculation
Total Salts (Solubility)	0.14	%	EPA 160.1

Sample ID: B-22 @ 22.0-23.0'

Analysis	Result	Unit	Method
Sodium	0.00	%	ASTM D2791
Sulfate	0.10	%	SM 4500 E
Sodium Sulfate	0.00	%	Calculation
Total Salts (Solubility)	0.56	%	EPA 160.1

Sample ID: B-29 @ 2.0-3.0'

Analysis	Result	Unit	Method
Sodium	0.01	%	ASTM D2791
Sulfate	0.00	%	SM 4500 E
Sodium Sulfate	0.00	%	Calculation
Total Salts (Solubility)	0.05	%	EPA 160.1

Sample ID: B-19 @ 16.0-17.0'

Analysis	Result	Unit	Method
Sodium	0.03	%	ASTM D2791
Sulfate	0.21	%	SM 4500 E
Sodium Sulfate	0.09	%	Calculation
Total Salts (Solubility)	1.35	%	EPA 160.1

Silver State Analytical Laboratories
Report Number: 06-0678
March 2, 2006

Sample ID: B-21 @ 6.0-7.0'


Analysis	Result	Unit	Method
Sodium	0.00	%	ASTM D2791
Sulfate	0.01	%	SM 4500 E
Sodium Sulfate	0.00	%	Calculation
Total Salts (Solubility)	0.72	%	EPA 160.1

APPENDIX D

Boring Logs from Previous Evaluation

Ninyo & Moore previously performed borings during the preliminary geotechnical evaluation for the project. The boring logs from the preliminary evaluation are presented in this appendix.

DEPTH (feet)	SAMPLES	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>03/04/2005</u> BORING NO. <u>B-1</u>	
							GROUND ELEVATION <u>Not measured</u> SHEET <u>1</u> OF <u>1</u>	
METHOD OF DRILLING <u>CME 75 Hollow Stem Auger Drill Rig</u>							DRIVE WEIGHT <u>140 lbs. (Cathead)</u> DROP <u>30"</u>	
SAMPLED BY <u>RCH</u> LOGGED BY <u>RCH</u> REVIEWED BY <u>BLO</u>							DESCRIPTION/INTERPRETATION	
0		51	4.7	122.5		SM	<u>ALLUVIUM:</u> Brown, damp, loose to medium dense, silty SAND with gravel; upper approximate 6" of unit is loose.	
						SC	Brown, damp, medium dense, clayey SAND with gravel.	
						GP-GC	Brown, damp, medium dense, poorly graded GRAVEL with clay and sand.	
						GC	Brown, damp, very dense, clayey GRAVEL with sand.	
5		50/4"	3.2	118.0			Sampler refusal after 10". Slightly cemented.	
10		50/5"	10.4	76.4		CL	Moist; sampler refusal after 11". Light brown, damp, very stiff, sandy lean CLAY with gravel; slightly cemented; slightly to moderately gypsiferous.	
15		50/2"	10.4	96.1			Sampler refusal after 8". Total depth = 14.7 feet. Groundwater not encountered during drilling. Backfilled on 03/04/2005.	
20								




BORING LOG

PROPOSED VETERANS AFFAIRS MEDICAL CENTER
NORTH LAS VEGAS, NEVADA


PROJECT NO.	DATE	FIGURE
301699002	03/2005	A-1

DEPTH (feet)	Bulk Driven	SAMPLES	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>03/04/2005</u> BORING NO. <u>B-2</u> GROUND ELEVATION <u>Not measured</u> SHEET <u>1</u> OF <u>1</u> METHOD OF DRILLING <u>CME 75 Hollow Stem Auger Drill Rig</u> DRIVE WEIGHT <u>140 lbs. (Cathead)</u> DROP <u>30"</u> SAMPLED BY <u>RCH</u> LOGGED BY <u>RCH</u> REVIEWED BY <u>BLO</u> DESCRIPTION/INTERPRETATION		
								0		
			74	3.8	120.3					
				4.5	120.2		GP-GC	Brown, damp, dense, poorly graded GRAVEL with silty clay and sand.		
								Moist.		
5			92/10"	8.6	110.9			Very dense; slightly cemented; sampler refusal after 16".		
			50/5"	2.7	114.0			Damp; slightly gypsiferous. Sampler refusal after 11".		
10							SC	Light brown, damp, very dense, clayey SAND with gravel; slightly cemented.		
			50/3"	6.8	97.4		CL	Sampler refusal after 9". Brown, damp, very stiff, sandy lean CLAY; slightly cemented. Total depth = 14.8 feet. Groundwater not encountered during drilling. Backfilled on 03/04/2005.		
15										
20										




BORING LOG		
PROPOSED VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699002	DATE 03/2005	FIGURE A-2

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>03/04/2005</u> BORING NO. <u>B-3</u>	
							GROUND ELEVATION <u>Not measured</u> SHEET <u>1</u> OF <u>2</u>	
METHOD OF DRILLING <u>CME 75 Hollow Stem Auger Drill Rig</u>							DRIVE WEIGHT <u>140 lbs. (Cathead)</u> DROP <u>30"</u>	
SAMPLED BY <u>RCH</u> LOGGED BY <u>RCH</u> REVIEWED BY <u>BLO</u>							DESCRIPTION/INTERPRETATION	
0						GM	<u>ALLUVIUM:</u> Brown, damp, medium dense, silty GRAVEL with sand; scattered roots.	
		81	6.5	113.8		GC	Brown, damp, dense, clayey GRAVEL with sand.	
		50/4"	4.9	101.9			Very dense; slightly cemented; sampler refusal after 10".	
5								
		50/4"	4.8	93.5			Sampler refusal after 10".	
10			3.7	85.4		CL	Light brown, damp, very stiff, sandy lean CLAY with gravel; slightly cemented.	
		81/11"	7.3	99.4			Sampler refusal after 17".	
15								
		50/5"	7.4	93.5			Slightly to moderately porous. Sampler refusal after 11".	
20								




BORING LOG		
PROPOSED VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699002	DATE 03/2005	FIGURE A-3

DEPTH (feet)	BULK DRIVEN	SAMPLES	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>03/04/2005</u> BORING NO. <u>B-3</u> GROUND ELEVATION <u>Not measured</u> SHEET <u>2</u> OF <u>2</u> METHOD OF DRILLING <u>CME 75 Hollow Stem Auger Drill Rig</u> DRIVE WEIGHT <u>140 lbs. (Cathead)</u> DROP <u>30"</u> SAMPLED BY <u>RCH</u> LOGGED BY <u>RCH</u> REVIEWED BY <u>BLO</u> DESCRIPTION/INTERPRETATION		
								20		
25			82	7.2	108.9		CL	Light reddish brown, damp, very stiff, sandy lean CLAY; slightly cemented; slightly porous. Moist.		
30			50/5"	8.4	89.3			Sampler refusal after 11". Total depth = 29.9 feet. Groundwater not encountered during drilling. Backfilled on 03/04/2005.		
35										
40										




BORING LOG		
PROPOSED VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699002	DATE 03/2005	FIGURE A-4

DEPTH (feet)	BULK DRIVEN	SAMPLES	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>03/04/2005</u> BORING NO. <u>B-4</u> GROUND ELEVATION <u>Not measured</u> SHEET <u>1</u> OF <u>1</u> METHOD OF DRILLING <u>CME 75 Hollow Stem Auger Drill Rig</u> DRIVE WEIGHT <u>140 lbs. (Cathead)</u> DROP <u>30"</u> SAMPLED BY <u>RCH</u> LOGGED BY <u>RCH</u> REVIEWED BY <u>BLO</u> DESCRIPTION/INTERPRETATION		
								0		
			82/10"	5.8	136.1		GC	Brown, damp, dense, clayey GRAVEL with sand. Very dense. Sampler refusal after 16". Slightly cemented. Very dense. Sampler refusal after 11".		
5			50/5"	8.1	107.5					
			50/5"	3.1	95.3		CL	Sampler refusal after 11". Light brown, moist, very stiff, sandy lean CLAY; few gravel; moderately to highly gypsiferous; slightly cemented; slightly porous.		
10				7.7	86.7					
							SC	Light brown, damp, very dense, clayey SAND with gravel; moderately to highly gypsiferous; slightly cemented.		
			50/1"	7.4	89.4			Sampler refusal after 7". Total depth = 14.6 feet. Groundwater not encountered during drilling. Backfilled on 03/04/2005.		
15										
20										



BORING LOG		
PROPOSED VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699002	DATE 03/2005	FIGURE A-5

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>03/04/2005</u> BORING NO. <u>B-5</u>	
							GROUND ELEVATION <u>Not measured</u> SHEET <u>1</u> OF <u>2</u>	
METHOD OF DRILLING <u>CME 75 Hollow Stem Auger Drill Rig</u>							DRIVE WEIGHT <u>140 lbs. (Cathead)</u> DROP <u>30"</u>	
SAMPLED BY <u>RCH</u> LOGGED BY <u>RCH</u> REVIEWED BY <u>BLO</u>							DESCRIPTION/INTERPRETATION	
0						GM	<u>ALLUVIUM:</u>	
		58	4.8	120.5		GC	Brown, damp, medium dense, silty GRAVEL with sand; scattered roots.	
							Brown, damp, medium dense, clayey GRAVEL with sand.	
							Very dense.	
5		50/5"	5.8	114.7			Sampler refusal after 11".	
						SC	Light brown, damp, very dense, clayey SAND with gravel; slightly cemented.	
							Sampler refusal after 10".	
10		50/4"				GC	Light brown, damp, very dense, clayey GRAVEL with sand.	
						CL	Light brown, damp, very stiff, sandy lean CLAY; slightly cemented; a few moderately hard, moderately cemented layers up to a few inches thick.	
15		50/2"	6.4	94.6			Sampler refusal after 8".	
							Mottled light brown and brown; slightly porous.	
20		50/5"	9.4	93.3			Sampler refusal after 11".	



BORING LOG		
PROPOSED VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699002	DATE 03/2005	FIGURE A-6

DEPTH (feet)	SAMPLES	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED	BORING NO.	
							03/04/2005	B-5	
							GROUND ELEVATION	SHEET	OF
							Not measured	2	2
							METHOD OF DRILLING		
							CME 75 Hollow Stem Auger Drill Rig		
							DRIVE WEIGHT	DROP	
							140 lbs. (Cathead)	30"	
							SAMPLED BY	LOGGED BY	REVIEWED BY
							RCH	RCH	BLO
							DESCRIPTION/INTERPRETATION		
20							Total depth = 19.9 feet. Groundwater not encountered during drilling. Backfilled on 03/04/2005.		
25									
30									
35									
40									




BORING LOG

PROPOSED VETERANS AFFAIRS MEDICAL CENTER
NORTH LAS VEGAS, NEVADA

PROJECT NO.	DATE	FIGURE
301699002	03/2005	A-7


DEPTH (feet)	SAMPLES	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>03/04/2005</u> BORING NO. <u>B-6</u> GROUND ELEVATION <u>Not measured</u> SHEET <u>1</u> OF <u>1</u> METHOD OF DRILLING <u>CME 75 Hollow Stem Auger Drill Rig</u> DRIVE WEIGHT <u>140 lbs. (Cathead)</u> DROP <u>30"</u> SAMPLED BY <u>RCH</u> LOGGED BY <u>RCH</u> REVIEWED BY <u>BLO</u> DESCRIPTION/INTERPRETATION	
0						SM	<u>ALLUVIUM:</u> Brown, damp, medium dense, silty SAND; few gravel; scattered roots.	
						GC	Brown, damp, medium dense, clayey GRAVEL with sand.	
		60	4.3	119.0				
		50/5"	5.6	106.7			Light brown to brown; slightly cemented. Very dense. Sampler refusal after 5".	
5								
		50/2"					Sampler refusal after 8".	
10								
		50/4"	10.9	97.1		CL	Sampler refusal after 10". Light brown, damp, very stiff, lean CLAY with gravel; slightly cemented. Total depth = 14.8 feet. Groundwater not encountered during drilling. Backfilled on 03/04/2005.	
15								
20								



BORING LOG
PROPOSED VETERANS AFFAIRS MEDICAL CENTER
NORTH LAS VEGAS, NEVADA


PROJECT NO.	DATE	FIGURE
301699002	03/2005	A-8

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>03/07/2005</u> BORING NO. <u>B-7</u>	
							GROUND ELEVATION <u>Not measured</u> SHEET <u>1</u> OF <u>1</u>	
METHOD OF DRILLING <u>CME 75 Hollow Stem Auger Drill Rig</u>							DRIVE WEIGHT <u>140 lbs. (Cathead)</u> DROP <u>30"</u>	
SAMPLED BY <u>RCH</u> LOGGED BY <u>RCH</u> REVIEWED BY <u>BLO</u>							DESCRIPTION/INTERPRETATION	
0						GM	<u>ALLUVIUM:</u> Brown, damp, medium dense, silty GRAVEL with sand.	
59		59	5.3	116.1		GP-GC	Brown, damp, medium dense, poorly graded GRAVEL with clay and sand. Very dense. Sampler refusal after 5". Light brown to brown; slightly cemented.	
50/5"								
5								
10		50/3"	8.2	86.4		CL	Light brown to brown, damp, very stiff, sandy lean CLAY with gravel; slightly cemented; moderately to highly gypsiferous.	
						GC	Sampler refusal after 9". Light brown to brown, damp, very dense, clayey GRAVEL with sand.	
						CL	Light brown to brown, damp, very stiff, sandy lean CLAY with gravel; slightly cemented.	
15		50/2"	7.1	90.5			Sampler refusal after 8". Total depth = 15.7 feet. Groundwater not encountered during drilling. Backfilled on 03/07/2005.	
20								




BORING LOG		
PROPOSED VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699002	DATE 03/2005	FIGURE A-9

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>03/07/2005</u> BORING NO. <u>B-8</u>	
							GROUND ELEVATION <u>Not measured</u> SHEET <u>1</u> OF <u>2</u>	
METHOD OF DRILLING <u>CME 75 Hollow Stem Auger Drill Rig</u>							DRIVE WEIGHT <u>140 lbs. (Cathead)</u> DROP <u>30"</u>	
SAMPLED BY <u>RCH</u> LOGGED BY <u>RCH</u> REVIEWED BY <u>BLO</u>							DESCRIPTION/INTERPRETATION	
0						SM	<u>ALLUVIUM:</u> Brown, damp, loose to medium dense, silty SAND; scattered roots.	
						GM	Brown, damp, medium dense, silty GRAVEL with sand.	
		75	10.1 9.8	112.2 105.9		GC	Brown, damp, dense, clayey GRAVEL with sand.	
5		84/10"	3.6	113.1			Very dense. Sampler refusal after 16". Slightly cemented.	
						CL	Light brown, damp, very stiff, sandy lean CLAY with gravel; slightly cemented.	
10		50/3"					Sampler refusal after 9".	
							Light brown, damp, moderately hard, CALICHE; moderately cemented; composed primarily of fine-grained material.	
15		50/5"					Sampler refusal after 5".	
						CL	Light brown, damp, very stiff, sandy lean CLAY with gravel; slightly cemented; a few moderately hard, moderately cemented layers up to a few inches thick.	
20		50/5"	5.7	94.7			Sampler refusal after 5". Total depth = 19.4 feet.	



BORING LOG		
PROPOSED VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699002	DATE 03/2005	FIGURE A-10

DEPTH (feet)	SAMPLES	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED	BORING NO.
							GROUND ELEVATION	SHEET
							03/07/2005	B-8
							Not measured	2 OF 2
							METHOD OF DRILLING CME 75 Hollow Stem Auger Drill Rig	
							140 lbs. (Cathead)	DROP 30"
							SAMPLED BY RCH	LOGGED BY RCH REVIEWED BY BLO
							DESCRIPTION/INTERPRETATION	
20							Groundwater not encountered during drilling. Backfilled on 03/07/2005.	
25								
30								
35								
40								



BORING LOG		
PROPOSED VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699002	DATE 03/2005	FIGURE A-11

DEPTH (feet)	Bulk Driven	SAMPLES	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>03/07/2005</u> BORING NO. <u>B-9</u>	
								GROUND ELEVATION <u>Not measured</u> SHEET <u>1</u> OF <u>1</u>	
METHOD OF DRILLING <u>CME 75 Hollow Stem Auger Drill Rig</u>								DRIVE WEIGHT <u>140 lbs. (Cathead)</u> DROP <u>30"</u>	
SAMPLED BY <u>RCH</u> LOGGED BY <u>RCH</u> REVIEWED BY <u>BLO</u>								DESCRIPTION/INTERPRETATION	
0							GM	<u>ALLUVIUM:</u> Brown, damp, loose to medium dense, silty GRAVEL with sand; scattered roots. Medium dense.	
			37	8.7	108.8		GC	Brown, damp, medium dense, clayey GRAVEL with sand.	
							CL	Light brown, damp, very stiff, sandy lean CLAY with gravel; slightly cemented; slightly gypsiferous; a few moderately cemented, moderately hard layers up to a few inches thick.	
5			59	5.8	86.5				
			50/5"	7.5	91.7			Sampler refusal after 5".	
10									
			50/3"	7.6	95.7			Layer of clayey gravel with sand a few inches thick.	
15								Sampler refusal after 9". Total depth = 14.8 feet. Groundwater not encountered during drilling. Backfilled on 03/07/2005.	
20									

Ninyo & Moore

BORING LOG

PROPOSED VETERANS AFFAIRS MEDICAL CENTER
NORTH LAS VEGAS, NEVADA

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FIGURE

A-12

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED	BORING NO.
							GROUND ELEVATION	SHEET
							03/07/2005	B-10
							Not measured	1 OF 1
							METHOD OF DRILLING CME 75 Hollow Stem Auger Drill Rig	
							140 lbs. (Cathead)	DROP 30"
							SAMPLED BY RCH	LOGGED BY RCH REVIEWED BY BLO
							DESCRIPTION/INTERPRETATION	
0						SM	ALLUVIUM: Brown, damp, medium dense, silty SAND with gravel.	
						GP-GC	Brown, damp, dense, poorly graded GRAVEL with clay and sand.	
		78/11"	4.2	124.2			Very dense. Sampler refusal after 17". Dense.	
							Very dense. Sampler refusal after 16". Slightly cemented.	
5		96/10"	6.3	110.9			Moderately hard, moderately cemented layer a few inches thick.	
						SC	Brown, damp, very dense, clayey SAND with gravel; slightly cemented.	
							Sampler refusal after 11".	
10		50/5"	6.2	95.1		CL	Light brown, damp, very stiff, sandy lean CLAY; moderately to highly gypsiferous; slightly cemented; a few moderately hard, moderately cemented layers up to a few inches thick.	
							Sampler refusal after 5".	
15		50/5"					Total depth = 14.4 feet. Groundwater not encountered during drilling. Backfilled on 03/07/2005.	
20								

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BORING LOG

PROPOSED VETERANS AFFAIRS MEDICAL CENTER
NORTH LAS VEGAS, NEVADA

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FIGURE


A-13

DEPTH (feet)	BULK SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>03/07/2005</u> BORING NO. <u>B-11</u> GROUND ELEVATION <u>Not measured</u> SHEET <u>1</u> OF <u>1</u> METHOD OF DRILLING <u>CME 75 Hollow Stem Auger Drill Rig</u> DRIVE WEIGHT <u>140 lbs. (Cathead)</u> DROP <u>30"</u> SAMPLED BY <u>RCH</u> LOGGED BY <u>RCH</u> REVIEWED BY <u>BLO</u> DESCRIPTION/INTERPRETATION		
							0		
		68	6.2	120.1		GC	Brown, damp, dense, clayey GRAVEL with sand. Very dense. Sampler refusal after 10". Slightly cemented.		
5		50/4"	5.2	106.0					
10		50/5"	5.1	85.5		CL	Sampler refusal after 11". Light brown, damp, very stiff, sandy lean CLAY; slightly cemented; moderately gypsiferous.		
						SC	Light brown, damp, very dense, clayey SAND with gravel; slightly cemented.		
15		50/2"					Sampler refusal after 8". Total depth = 14.7 feet. Groundwater not encountered during drilling. Backfilled on 03/07/2005.		
20									



BORING LOG		
PROPOSED VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699002	DATE 03/2005	FIGURE A-14

DEPTH (feet)	SAMPLES Bulk Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>03/07/2005</u> BORING NO. <u>B-12</u> GROUND ELEVATION <u>Not measured</u> SHEET <u>1</u> OF <u>3</u> METHOD OF DRILLING <u>CME 75 Hollow Stem Auger Drill Rig</u> DRIVE WEIGHT <u>140 lbs. (Cathead)</u> DROP <u>30"</u> SAMPLED BY <u>RCH</u> LOGGED BY <u>RCH</u> REVIEWED BY <u>BLO</u> DESCRIPTION/INTERPRETATION		
							0		
		42	9.9	106.0		GC	Moist; medium dense. Brown, moist, medium dense, clayey GRAVEL with sand.		
5		93/10"	9.9	93.6			Sampler refusal after 16". Very dense.		
						SC	Brown to light brown, damp, very dense, clayey SAND with gravel; slightly cemented.		
10		50/3"	7.4	90.9		CL	Light brown, damp, very stiff, sandy lean CLAY; slightly cemented; moderately gypsiferous. Sampler refusal after 9". Increase in sand and gravel content.		
15		50/1"	8.1	88.7			Sampler refusal after 7". Light brown, damp, moderately hard, CALICHE; moderately cemented; composed primarily of fine-grained material.		
		50/4"					Sampler refusal after 4".		
20									




BORING LOG		
PROPOSED VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699002	DATE 03/2005	FIGURE A-15

DEPTH (feet)	SAMPLES	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>03/07/2005</u> BORING NO. <u>B-12</u> GROUND ELEVATION <u>Not measured</u> SHEET <u>2</u> OF <u>3</u> METHOD OF DRILLING <u>CME 75 Hollow Stem Auger Drill Rig</u> DRIVE WEIGHT <u>140 lbs. (Cathead)</u> DROP <u>30"</u> SAMPLED BY <u>RCH</u> LOGGED BY <u>RCH</u> REVIEWED BY <u>BLO</u> DESCRIPTION/INTERPRETATION		
20							ALLUVIUM (continued): Light brown, damp, moderately hard, CALICHE; moderately cemented; composed primarily of fine-grained material. Light brown, damp, very stiff, sandy lean CLAY; few gravel; slightly cemented; a few moderately hard, moderately cemented layers up to approximately a few inches thick.		
25		50/2"	7.7	96.7		CL	Sampler refusal after 8".		
30		50/3"					Light brown, damp, hard, CALICHE; strongly cemented; composed primarily of fine-grained material. Sampler refusal after 3". A few slightly cemented layers up to a few inches thick.		
35		50/3"					Sampler refusal after 3".		
40		50/5"	8.0	87.0		CL	Light brown, damp, very stiff, lean CLAY; slightly cemented. Sampler refusal after 5". Total depth = 39.4 feet.		

BORING LOG		
PROPOSED VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699002	DATE 03/2005	FIGURE A-16

DEPTH (feet)	Bulk Driven	SAMPLES	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DATE DRILLED <u>03/07/2005</u> BORING NO. <u>B-12</u>		
								GROUND ELEVATION <u>Not measured</u> SHEET <u>3</u> OF <u>3</u>		
METHOD OF DRILLING <u>CME 75 Hollow Stem Auger Drill Rig</u>								DRIVE WEIGHT <u>140 lbs. (Cathead)</u> DROP <u>30"</u>		
SAMPLED BY <u>RCH</u> LOGGED BY <u>RCH</u> REVIEWED BY <u>BLO</u>								DESCRIPTION/INTERPRETATION		
40								Groundwater not encountered during drilling. Backfilled on 03/07/2005.		
45										
50										
55										
60										



BORING LOG		
PROPOSED VETERANS AFFAIRS MEDICAL CENTER NORTH LAS VEGAS, NEVADA		
PROJECT NO. 301699002	DATE 03/2005	FIGURE A-17

